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GOVERNMENT OF THE UNION OF BURMA

Burma.

MINISTRY OF NATIONAL PLANNING/ AND RELIGIOUS AFFAIRS

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COMPREHENSIVE DEVELOPMENT PLAN

Supplement, September 30, 1955

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AGRICULTURE

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No. Ah Nya 830/00/55

Government of the Union of Burma
Ministry of National Planning and Religious Affairs
44, Kandawgalay House, Rangoon

Dated the 15th December 1955

Subject: Comprehensive Development Plan --
Transmittal of Supplement, "Agriculture"

Broad systematic planning for the development of the resources of the Union of Burma received its first major impetus with the presentation of the Pyidawtha Programme at the Union Conference in August 1952. This Programme was enlarged and strengthened by the completion in August 1953 of the more detailed "Comprehensive Report on the Economic and Engineering Development of Burma".*

It is the present programme of this Ministry to enlarge and amend the Comprehensive Plan as rapidly as additional planning information and studies will permit. The accompanying supplement, entitled "Agriculture", is therefore to be regarded as the current revision of this subject, amending and supplementing Chapter 8 of the Comprehensive Report of 1953 in the Government's Comprehensive Development Plan.

The official Comprehensive Development Plan of the Government may be considered to comprise at present the following reports:

1.	Preliminary Report on Economic and Engineering Survey of Burma	January 1952
2.	The Pyidawtha Conference (Resolutions and Speeches)	August 1952
3.	Comprehensive Report on Economic and Engineering Development of Burma	August 1953
4.	Summary of Proceedings -- Conference on Programme of Development and Reconstruction	February 1954
5.	Supplements: a. Agriculture b. Seaports of Burma (Outports only) c. Ocean Shipping d. Telecommunications e. Electric Power f. Mineral Industries (Others in preparation)	September 1955

(Mo Myit)
Secretary
Ministry of National Planning
& Religious Affairs

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* Prepared under the auspices of the Ministry of National Planning with funds provided by the Technical Co-operation Administration (U.S.) by Knappen Tippetts Abbett McCarthy, Engineers in association with Pierce Management Inc. and Robert R. Nathan Associates, Inc.

GOVERNMENT OF THE UNION OF BURMA
MINISTRY OF NATIONAL PLANNING AND RELIGIOUS AFFAIRS

COMPREHENSIVE DEVELOPMENT PLAN

Supplement, September 30, 1955

AGRICULTURE

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10/12/55

AGRICULTURE

A. KTAM COMPREHENSIVE REPORT RECOMMENDATIONS

1. The following recommendations were made in respect to Agriculture in the KTAM Report of 1953:

a. The Land Nationalization Program.

(1) Efforts should be made to eliminate absentee ownership of tenant land and the distribution to present tenant ownership.

(2) The purchase of owner operated land in excess of 50 acres should be carried through with exception to the 50 acre limit being permitted where the cultivator has equipment necessary for mechanized farming and if there are surplus lands available.

(3) Individual holders should be encouraged to farm their holdings jointly under a cooperative arrangement.

(4) Periodic checks should be made to insure proper labor standards and production efficiency.

(5) Changes in the management unit should be minimized and changes in landholding rights stressed.

(6) The total program should be integrated with development of cooperatives, production methods, mechanization and the pursuit of other goals.

b. The Five Year Plan.

(1) The program selected by the Agricultural and Water Resources Development Corporation for immediate implementation should be diligently pursued with continued vigilance for additions and changes.

c. Financing the Farmers.

(1) Carry out intensive information program to educate farmers in the proper use of credit.

(2) Build up responsibility at village level by insisting on adherence to certain minimum financial standards including contributions to share capital.

(3) Continue program to establish gradually branches of the State Agricultural Banks in all districts.

(4) Encourage the repayment of loans in kind wherever possible.

(5) Establish procedures to enable the Agricultural Department to issue improved seed, fertilizers and implements on credit in conjunction with the system of state agricultural credit and the farm extension and demonstration services.

d. Agricultural taxation.

(1) Land revenues should not be increased until such time as persons in the income bracket of the cultivator are also subject to direct taxation.

(2) Land records should be taken over by the agency managing state owned lands under the lands nationalization program.

(3) Collection of crop statistics should be separated from the tax collection function and established under an independent agency.

(4) Consideration should be given to making the land revenue tax a source of local government revenue.

e. Marketing the Crop.

(1) Assistance should be given the farmer in getting better prices for his crops by formation of cooperatives, standardization of grades, adoption of uniform weights and measures, provisions for furnishing market

information, price stabilization policies and inspection of weights and measures.

(2) The board development, testing and regulation of standards should be legislatively assigned to a central scientific organization with enforcement vested in various interested agencies.

(3) A market outlook service should be established to provide farmers with accurate information on current and expected prices with timely forecasts on crop acreage and yield.

(4) Pricing programs should be set up on crops for which Government is prepared to enter the market and offer incentive prices for new crops such as jute and long staple cotton.

(5) More cooperatives should be established through an expanded agricultural education and information program for acquainting farmers with the basis for collective credit, transportation, market data, storage, threshing and simple processing.

f. The State Agricultural Marketing Board.

(1) Rice should be sold more expeditiously in order to maximize sales at current prices and hold existing markets.

(2) Earlier shipments should be made to relieve the rice storage problem.

(3) Storage facilities secure against insects, rodents and other spoilage should be provided.

(4) Bulk handling facilities should be constructed so that the Government will be able to store sufficient rice to spread the shipments over a longer period and take advantage of short term fluctuations.

(5) The possibility of arranging trade agreements for the sale of rice should be explored.

(6) Continued effort should be made to imrpve the quality of rice, encourage the use of improved seed, and establish uniform standards o grading.

g. Government Organization for Agriculture.

(1) The principal agricultural functions should be brought together under one Ministry.

(2) The staff of the Secretariat of the Ministry should be greatly strengthened to provide a small group of experienced agriculturists of administrative calibre to plan and expedite an integrated program.

(3) An agricultural information service should be established to prepare general and technical bulletins, publish popular periodicals and a farm magazine, and prepare special exhibits and equipment. It should use audio visual programs.

(4) A central ministerial library with a qualified librarian should be established.

(5) There should be a separate department for land nationalization with a post of Deputy Secretary and all the present agencie under the present Land Nationalization Ministry should be transferred to the new department with the exception of crop reporting function of Commissioner of Settlement and Land Records, which should be under the proposed Statistics Department.

(6) The new Department of Lands Nationalization should take over the enforcement of rent controls and tenancy disposals.

(7) The Agricultural Department should be greatly expanded.

(8) The engineering functions of the Irrigation Department should be transferred to the Ministry of Engineering Services and the Irrigation Department of the Ministry to Agriculture should retain only responsibility for maintenance and operation of irrigation works,

supervision of the application of water to the land and relations with water users.

(9) A Cooperative Societies Department should be established in the Ministry of Agriculture to take over the program now planned by the Ministry of Land Nationalization as well as the agricultural cooperative program of the present Cooperative Department.

(10) The State Agricultural Credit Department, the Veterinary Department, the Fisheries Department and the Forests Department should continue in their present functions with work of inspection and certification of livestock products added to the Veterinary Department.

(11) The Planning staff proposed for the new Ministry should take over all the planning of the Agricultural and Water Resources Development Corporation and the Corporation should be responsible for funds only.

(12) The Corporation should be directly under the joint secretary for planning, who would also be head of the planning staff.

(13) The S.A.M.B. should be an independent board directly under the President and the composition of the Board should be altered to provide adequate representation of all agencies concerned.

(14) The field staffs of all departments should be consolidated into one office to economize and standardize services and facilities such as transportation, housing and administration.

(15) The post of Financial Commissioner should be abolished.

(16) Advanced agricultural practices including intensification of cultivation, use of fertilizers, partial mechanization, and new irrigation projects for increase of agricultural production should be

introduced in accordance with a systematic program phased approximately as shown in a Table included in the Report.

(17) That five demonstration farms be established at the locations suggested in the Report: (Toungoo, Pyinmana, Yamethin, Pakokku and Loikaw).

h. Extension.

(1) Training extension methods should be instituted immediately with courses at Mandalay College, the Agricultural Training Institute and Central Farms Schools.

(2) A manual of extension methods should be prepared as a practical guide for extension workers.

(3) Fields of coverage should include basic information on soils, crops, farming methods and the dissemination of information on the care and management of livestock.

(4) A program of establishing youth training groups should be started.

(5) Various means of implementing the research and extension programs should be adopted from outline in report.

(6) The beginning extension program should be carried out to the tract level, and most support and emphasis should be given to local extension agents.

i. Research.

(1) Specific emphasis should be given to the introduction of new crops.

(2) Improve seed other than paddy.

(3) Classify insects and establish control methods and costs.

(4) Survey indigenous diseases.

(5) Investigate trace element deficiencies in the soils and establish the necessary library and laboratory facilities.

(6) Survey and classify natural resources that would support a livestock industry, areas best suited to livestock production, forage plant populations, supplies of supplementary feed, livestock pests and diseases, breeds best suited to the country and possibilities for processing various animal products.

(7) An agricultural engineering staff should be organized to develop methods of farming for both mechanized equipment and improved implements.

(8) Aerial photo coverage of the whole of Burma should be undertaken and used in determining unknown land areas, boundaries, erosion conditions, drainage basins, possible communication routes and administration of the land subsidy program.

(9) Land classification should be given immediate consideration with the objective of classifying land according to its basic resources and present condition.

(10) Effective research, if limited by insufficient funds, should be restricted in its coverage and complete in its intensity of application.

j. Irrigation.

(1) Irrigation should be developed in the areas set forth in the Report.

B. ACTION TAKEN BY CONFERENCES ON PROGRAM OF DEVELOPMENT AND RECONSTRUCTION, 15-22 FEBRUARY, 1954.

1. The recommendations outlined in the preceding pages were studied by the several interested departments of government. A conference to discuss the program and to present the views of these agencies was held by the Honorable Prime Minister on 25 February 1954. The recommendations were generally accepted with the following exceptions:

a. The recommendations relating to the regrouping of various agencies concerned with agriculture into one Ministry of Agriculture were deferred pending the development of a master plan for agriculture and a general study of Government Administrative practices.

The Ministry of Cooperation and Commodity distribution objected particularly to the proposal to transfer the Agriculture cooperation activities of that Ministry to the Ministry of Agriculture as being a reversal of previous decisions designed to group various cooperative activities together for more effective implementations.

b. The recommendations to abolish the post of Financial Commissioners (Lands and Rural Development) was opposed by the Committee on Agriculture and Forests.

c. The recommendation that the collection of crop statistics should be separated from the tax collection function and established under an independent agency was to be considered by the Ministry of Finance and Revenue and the Ministry of Lands Nationalization.

d. The recommendations relating to the operations of the State Agricultural Marketing Board were not discussed specifically during the conference.

C. ACTION TAKEN BY IMPLEMENTING AGENCIES.

1. The Union of Burma Agricultural Planning Advisory Committee was appointed under a Government resolution dated 12 July 1954 to develop a comprehensive agricultural program. The Committee includes nine members under the Chairmanship of the Financial Commissioner (Land and Rural Development).

a. The terms of reference, according to the report of the committee were:

"(1) To advise on the setup of an organization for conducting an agricultural and economic survey of Burma with a view to drawing up a comprehensive and integrated agricultural plan for the Union;

(2) To advise on the method of recruiting experts, in particular foreign experts;

(3) To estimate expenditures of the proposed organization;

(4) To advise on the best method for conducting surveys so as to cover the points indicated in the Resolution viz:

(a) Land Classification

(b) Physical Productivity Survey

(c) Livestock Survey

(d) Economic Survey

(e) Economically sound programme for agricultural production and adjustment according to external and internal demands.

(f) Detailed Projects

(g) Examination and Coordination of the existing agricultural programs.

(h) Special projects for under development areas.

(5) To advise on the method of drawing up the plan.

(6) To advise on the best method for coordinating the proposed survey with the survey and research work now being undertaken by some Government Departments and Boards in Agriculture".

b. The objectives proposed by the committee for adoption under the Union of Burma Agricultural Plan are:

(1) To raise the standard of living of the cultivators.

(2) To make maximum contribution through agriculture to national income and economic development.

(3) To attain optimum use of agricultural resources.

(4) To increase production of agricultural commodities which can be exported economically to provide the required foreign exchange.

(5) To increase production of deficit agricultural commodities which can be produced in the Union.

(6) To take proper conservation and other measures required for preventing flood, denudation of land, formation of deserts, and for continuing increases in agricultural output.

(7) To integrate agricultural development with the economic development of the country as a whole, and

(8) To make provision for modifications in the plan in the light of changing conditions.

2. To carry out the planning to attain the above objectives "The Union of Burma Agricultural Planning Commission" was created. This commission consists of 36 members which were drawn from many agencies of Government concerned with agriculture and include representatives from cultivators' organizations. Their function is to deal with general policy

and to enlist mass support from all agencies and organizations. This commission was later renamed the Union of Burma Land and Agricultural Planning Commission and was established as an agency of the Agricultural and Rural Development Corporation to whom they report. The L.A.P.C. commenced functioning on 23 November 1954.

a. The appointment and control of staff and the management of funds was entrusted to an executive committee of six members under the Chairmanship of the Financial Commissioner (Land and Rural Development).

b. A planning staff organized into 7 principal divisions was set up. The divisions are as follows:

(1) Physical Resources Division.
(2) Crops Division.
(3) Livestock Division.
(4) Cooperation and Development Division.
(5) Land Reforms Division.
(6) Economic Division
(7) Organization Division.

It was proposed that the planning staff be drawn from the agencies and departments representated on the commission. As many staff members as possible were to be loaned on a full term basis and for specific purposes certain officers would be loaned on a part time basis.

c. The employment of 5 foreign experts was recommended:

(1) Agricultural Planning Advisor.
(2) Land Use Expert.
(3) Marketing Specialist.
(4) Economist to deal with production and economic objectives and related subjects.

(5) Economist to deal with agricultural finance and related subjects.

d. The report of the Agricultural Planning Advisory Committee outlined the specific subjects that were to be studied by the Land and Agricultural Planning Commission under the following general headings:

(1) Production Possibilities.
  - (a) Inventory of Physical Resources on a Regional Basis.
  - (b) Manpower.
  - (c) Agricultural Production on a Commodity basis.
  - (d) Technical Aspects.
  - (e) Economic Aspect.

(2) Institutional and Organization Aspects.
  - (a) Land Nationalization.
  - (b) Taxation.
  - (c) Agricultural Finance.
  - (d) Statistics.
  - (e) Marketing.
  - (f) Related Community Aspects.
  - (g) Research, Education and Extension.
  - (h) Government Organization.
  - (i) Cooperatives.
  - (j) Information and Public Relations.

(3) Goals and their Achievement.
  - (a) Commodity Goals and Projects.
  - (b) Technical Goals and Projects.
  - (c) Institutional Goals and Projects.

e. The commission has since 23 November 1954 been in the process of building up its personnel and starting the various studies which are to be coordinated into a Comprehensive Plan. The time allotted to accomplish the studies and to prepare the Comprehensive Program was 18 months from 1 October 1954, or the date of completion would be 31 March 1956. There was a delay of approximately seven weeks in forming the Commission and subsequently there has been some delay in assembling the personnel as it is likely that the final report will be delayed.

The Commission has in its plan for study, most of the recommendations made in the Comprehensive Report which have been briefly set out in the opening section of this review.

3. The Agricultural and Rural Development Corporation has been sponsoring implementation programs which are enumerated on Table I. During the first half of the fiscal year 1954-55 expenditures have been approximately 17 percent of the budget estimate.

A number of the important projects particularly the Rice Project, the Cotton Project, the Jute Project and the Sugar Cane Project on the basis of the relation of expenditures to budget estimates appear to have lagged considerably during the first half of the fiscal year.

D. CONCLUSIONS.

A detailed review of the progress of development in the field of agriculture in comparison with the recommendations of the Comprehensive Report is difficult to make at this time because studies on a general comprehensive program are now underway by the Lands and Agricultural Planning Commission. Any study undertaken at this time would result in a duplication of effort which does not seem justified. As has been noted above the report on this study is planned for completion on or shortly after 31 March 1956. It is recommended that further consideration of the Agricultural Program by the Ministry of National Planning be deferred until this report has been released.

TABLE I
ARDC PROJECTS

PROJECT OR ROGRAM	PROJECT OR DESCRIPTION	FINANCIAL DATA (IN KYATS LAKHS)				PHYSICAL PROGRESS
		Expenditures 1953-54	Budget Estimate 1954-55	Revised Budget Est. 1954-55	Expend Oct 54 to Apr 55	
1. Rice Project	Program for the intensification of yield per acre and improvement in quality of rice.	6.00	21.00	20.50	.24	Last year output of 390,920 baskets of pure seed from 175 seed gardens were distributed to various divisions. Loans and subsidies were issued to the cultivators through the Agricultural Department. 1960 tons of fertilizers were distributed to cultivators.
2. Groundnut Project	To increase the local supply of groundnuts and groundnut oils. 1954-55 Program of expansion of acreage, seed improvement, intensification of yield and introduction of mechanized production.	22.50	36.00	6.50	5.03	Pure quality groundnut seed was distributed in Pegu, Toungoo, Hanthawaddy, Bassein, Maubin and Henzada Districts. Winter groundnut acreage increased by estimated 25,000 acres. Experiments made for the cultivation of groundnuts in the Dry Zone by irrigation 1000 acres of seed garden was selected near Maymyo.

A R D C PROJECTS (Cont'd)

PROJECT OR PROGRAM	PROJECT OR DESCRIPTION	FINANCIAL DATA (IN KYATS LAKHS)				PHYSICAL PROGRESS
		Expenditures 1953-54	Budget Estimate 1954-55	Revised Budget Est. 1954-55	Expend. Oct 54 to Apr 55	
3. Cotton Project	To increase long staple cotton production to supply textile factories of Burma. (a) To get long staple cotton seed from extended Thapan gardens comprising 1000 acres. (b) To extend Thapan seed garden to3,000 acres during 1954-55. (c) To extend Mahlaing seed garden to 50 acres.	14.00	27.40	6.98	.61	About 12,050 bales of Mahlaing No.3 and No.5 cotton fiber was supplied to Thamaing Weaving Factory during March 1955. Distribution of pure cotton seeds was made in six districts for the expected output of 30,000 bales during the coming year.
4. Jute Project	**To increase local supply of jute for manufacture of gunny bags and rope. To put 150,000 acres into cultivation within 5 years, 21,350 acres to be put into cultivation in 15 districts in 1954-55.**	37.00	36.50	34.83	.07	**During second quarter 1954-55 Corporation officials made an educational tour of Delta and Sittang Valley for expansion of jute cultivation. Financial and other assistance was given cultivator. Arrangements were made to supply 20 pumps to pre-monsoon cultivators by end of March. About 350 acres of model jute plots to be made in 14 Districts. Fertilizers were distributed during second quarter.**

ARDC PROJECTS (Cont'd)

PROJECT OR PROGRAM	PROJECT OR DESCRIPTION	FINANCIAL DATA (IN KYATS LAKHS) Expenditures 1953-54	Budget Estimate 1954-55	Revised Budget Est 1954-55	Expend. Oct 54 to Apr 55	PHYSICAL PROGRESS
5. Dairy Farm	To increase local supply of milk and milk products. 1954-55 Program (a) Purchase 50 new cross bred cattle. (b) Build permanent buildings (c) Repair and improve tube wells. (d) Purchase land and motor transport.	15.27	23.73	17.35	6.07	The total number of cattle as of March was 257 of which 112 were calves. 30,476 pounds of milk were sold during March. Milk sterilization plant at present in process of construction at 9th mile Prome Road is to be completed in July.
6. Cattle Breeding Farm	To increase local supply of better bred draught cattle throughout the Union. Work program for 1954-55 is similar to dairy farm project.	1.40	23.00	12.23	1.58	Total number of cattle as of March 1955 was 305 head of which 108 were calves. Some of the buildings were completed and most of them were under construction.
7. Cocoanut Project	To make Burma self-sufficient in Cocoanut and Cocoanut products. To open Cocoanut gardens comprising 20,000 acres within 5 years. 1954-55 program is to open 18 Cocoanut gardens comprising 8,000 acres	21.60	29.90	22.63	7.47	Gardens are under close supervision by laborers. Only 70 percent of the 839,000 nuts planted last year were successful. Wells were drilled for water supply in dry season. The project is progressing.
8. Onion Project	To extend onion cultivation up to 10,000 acres for sufficient local supply. 1954-55 program is to extend 4473 acres under onion cultivation and to open 307 acres of seed garden in Kyaukse District.	.17	.80	5.27	.01	87 acres of onion seed garden is under cultivation and it is expected to produce 500 baskets of first quality seed by end of May. Due to timely prevention of insects and posts onion gardens are more successful than last year.

A R D C PROJECTS (Cont'd)

PROJECT OR PROGRAM	PROJECT OR DESCRIPTION	FINANCIAL DATA (IN KYATS LAKHS)				PHYSICAL PROGRESS
		Expenditures 1953-54	Budget Estimate 1954-55	Revised Budget Est 1954-55	Expend. Oct 54 to Apr 55	
9. Virginia Tobacco Project	To make Burma self sufficient in first quality Virginia tobacco within 5 years. 1954-55 program is to supply sufficient cured tobacco to cigarette manufacturers.	7.43	24.34	20.58	6.37	It is expected to complete tobacco curing in Southern Shan States, Mandalay, Pakokku and Henzada Districts by end of April. During quarter 10,000 viss of cured tobacco was sold to Ludu tobacco Co at 850 Kyats per 100 viss.
10. Fishery Project	To breed various species of fish suitable for Burma climate and to increase local production of fish and fish products 1954-55 program is to open Demonstration Ponds and to open fishery training classes for local personnel.	.61	7.60	8.80	.45	Fishery training course at Hlawga Lake was completed 26 March and 16 of 22 trainees passed examination. 40 acres were earmarked for Hlawga Demonstration Pond. Arrangements were made to purchase ships and other materials during quarter.
11. Afforestation Project	An eight year program directed toward the afforestation of arid land which has been deforested during the last thousand years, and transforming the desert into evergreen areas.	1.00	4.30	1.54	5.10	Desert trees such as Shah Htanaung etc were planted at the head of streams and creeks as an initial step, about 200,000 young plants would be planted monthly in various parts of the Popa area.
12. Mechanized Farming	To help cultivators with the aid of tractors wherever necessary. 1954-55 program consists of purchase of tractors, hiring	Nil	.70	71.53	.16	Expert from Israel employed to train local personnel in handling and repair. Arrangements made for purchase of 40 lakhs of tractors by 1954

A R D C PROJECTS (Cont'd)

PROJECT OR PROGRAM	PROJECT OR DESCRIPTION	FINANCIAL DATA (IN KYATS LAKHS) Expenditures 1953-54	Budget Estimate 1954-55	Revised Budget Est 1954-55	Expend. Oct 54 to Apr 55	PHYSICAL PROGRESS
13. Mule Breeding Farm	To improve the breed and to increase the supply of mules in the Union and the States.	5.32	6.32	5.61	.16	There are no mules on the farm at present. Fifty percent of the fencing and two temporary buildings have been completed during the second quarter. Construction of other buildings is in active progress.
14. Colonisation in Arakan Division	To clear jungle tracts, resettlement and reclamation of agricultural lands to put into cultivation of crops.	.78	Nil	Nil		444 acres of jungle tracts cleared and put into cultivation against a set target of 2400 acres. Very little progress due to insecurity.
15. Medicinal Herbs and other plantation crops	To increase local production in medicinal crops and spices now deficient in the country. 1954-55 Program is to produce 75,000 plants of pepper, clove and nutmeg in the nursery and then transplant into gardens.	.05	6.54	1.97	.14	Pineapples and spices grown in Windermere garden, Hmawbi garden and Myaungmya garden were succesful. Arrangements are being made to open seed garden for 100,000 pepper plants by mid May.
16. Integrated Forest Industries	To utilize forest products and wastes by means of scientific methods of production and manufacture.	2.00	18.00	18.41	3.38	During March 1955, furniture to the amount of K 1,24,821 was produced, seasoning of three tons of teak completed and 585.3 cu ft of seasoned teak 7447.3 cu ft of other seasoned hardwoods were stored for furniture construction. Impregnation of timber was also carried out during the quarter.

ARDC PROJECTS (Cont'd)

PROJECT OR PROGRAM	PROJECT OR DESCRIPTION	FINANCIAL DATA (IN KYATS LAKHS)				PHYSICAL PROGRESS
		Expenditures 1953-54	Budget Estimate 1954-55	Revised Budget Est 1954-55	Expend Oct 54 to Apr 55	
17. Information and Publicity Cooperation and Co-ordination of farmers and cultivators.	To encourage farmers and cultivators and to provide incentives to cultivation for growing better crops and breeding better animals.	.12	.74	.91	.47	During the quarter, educational campaigns were made by means of broadcasting, cinema films, newspapers and pamphlets.
18. World Festival of Trees Day	To promote conservation of soil and to replenish depletion of soil and fertility by growing more trees. 1954-55 program is to distribute and plant 2½ million trees on festival day.	2.20	2.00	2.25	Nil	The trees planted during last year's festival were growing successfully, especially in Windermere. The necessary arrangements were made for distribution of young plants on the coming festival day.
19. Long term loan project for Agricultural Development.	It is intended to provide loans to all cultivators and some private enterprises for reclamation of fallow lands in underdeveloped areas for agricultural uses.	.50	2.00	6.94	3.33	Kyats 45,000 was issued to sugarcane planters through Pyidawtha Committees in the Bhamo District, at the rate of K 150 per acre. Loans were issued to Bo Let Ya Co and for reclamation of land in the Kachin State and for orange, coffee and other plantation loans in Chin Hills.
20. Colonization of Cocos Island.	To set up a new colony in the Cocos Islands and put in a general administration for economic and social development of the Colony. To extend cocoanut plantations in the new colony.	2.00	3.50	6.50	3.28	Administration has been set up. Cocoanut plantations were successful and 50,000 first quality cocoanuts are ready for shipment.

A R D C PROJECTS (Cont'd)

PROJECT OR PROGRAM	PROJECT OR DESCRIPTION	FINANCIAL DATA (IN KYATS LAKHS) Expend-itures 1953-54	Budget Estimate 1954-55	Revised Budget Est. 1954-55	Expend. Oct 54 to Apr 55	PHYSICAL PROGRESS
21. Land and Agricultural Planning Commission	For coordinating planning of all agencies in the agricultural Sector.		7.00	9.65	4.52	Planning staff organized and functioning.
22. Sugar Cane Project	To put into cultivation ten thousand acres of sugar cane for an annual output of 100,000 tons as first step. 1954-55 program is to put 30,000 acres under sugarcane to supply the Namtu Sugar Mill scheduled for completion in February 1956.	12.00	-	1.92	.03	Plantations in active operation Loans and subsidies issued to the sugarcane cultivators in Myitkyina District amounting to K 123,338 during the quarter.
23. Betel nut Project	To increase local production by systematic gardening	.42	1.00	.30	Nil	Betelnut plants were successful and the plants were under supervision of Corporation laborers continuously.
24. Coffee Project	To increase local production and to train local personnel in scientific coffee cultivation.	nil	-	.99	.06	This project has just started and steps were taken for the acquisition of suitable land in Maymyo, Myitkyina and Bhamo Districts for coffee plant actions. Temporary training school buildings were completed 22 trainees at Maymyo and 2 selected from Shan and Karen States for training in Indonesia.

A R D C PROJECTS (Cont'd)

PROJECT OR PROGRAM	PROJECT OR DESCRIPTION	FINANCIAL DATA (IN KYATS LAKHS)				PHYSICAL PROGRESS
		Expenditures 1953-54	Budget Estimate 1954-55	Revised Budget Est 1954-55	Expend. Oct 54 to Apr 55	
25. Tube well drilling Project	To supply waters for crops during dry season and in arid areas.	nil	1.00	1.00	nil	Progress not reported.
26. Building Construction Project Engineering Section	To construct buildings and Plants for A.R.D.C. projects	.42	-	2.26	3.20	Milk sterilization plant for dairy farming project is scheduled for completion in July 1955.
27. Fowl Rearing Project	To increase local supply and produce a better quality of fowls and eggs.	nil	-	2.00	nil	Project only in planning stage.
28. Miscellaneous	All minor projects	n.a.	8.50	10.05	n.a.	
		154.79	292.37	299.50	51.73	

Burma.

GOVERNMENT OF THE UNION OF BURMA

MINISTRY OF NATIONAL PLANNING AND RELIGIOUS AFFAIRS

COMPREHENSIVE DEVELOPMENT PLAN

Supplement, September 30, 1955

[6.2]

I. SEAPORTS OF BURMA (Outports only)

- Akyab
- Bassein
- Moulmein
- Tavoy
- Mergui

II. OCEAN SHIPPING

358.31
B92c
pt.2

No. Ah Nya 831/00/55
Government of the Union of Burma
Ministry of National Planning & Religious Affairs
44 Kandawgalay House, Rangoon

Dated 15th December 1955

Subject: Comprehensive Development Plan — Transmittal of Supplements, "Seaports of Burma (Outports only)", "Inland Waterways", "Ocean Shipping", and "Airways".

Broad systematic planning for the development of the resources of the Union of Burma received its first major impetus with the presentation of the Pyidawtha Programme at the Union Conference in August 1952. This Programme was enlarged and strengthened by the completion in August 1953 of the more detailed "Comprehensive Report on the Economic and Engineering Development of Burma".*

It is the present programme of this Ministry to enlarge and amend the Comprehensive Plan as rapidly as additional planning information and studies will permit. The accompanying supplements are therefore to be regarded as the current revision of Chapter XII "Seaports of Burma (Outports only)", Chapter XIII "Inland Waterways", Chapter XIV "Ocean Shipping", and Chapter XVII "Airways" of the Comprehensive Report of 1953 in the Government's Comprehensive Development Plan.

The official Comprehensive Development Plan of the Government may be considered to comprise at present the following reports:

1.	Preliminary Report on Economic and Engineering Survey of Burma	January 1952
2.	The Pyidawtha Conference (Resolutions and Speeches)	August 1952
3.	Comprehensive Report on Economic and Engineering Development of Burma	August 1953
4.	Summary of Proceedings — Conference on Programme of Development and Reconstruction	February 1954
5.	Supplements:	September 1955
	a. Agriculture	
	b. Seaports of Burma (Outports only)	
	c. Inland Waterways	
	d. Ocean Shipping	
	e. Airways	
	f. Telecommunications	
	g. Electric Power	
	h. Mineral Industries	
	(Others in preparation)	

(Mo Myit)
Secretary
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* Prepared under the auspices of the Ministry of National Planning with funds provided by the Technical Co-operation Administration (U.S.) by Knappen Tippetts Abbett McCarthy, Engineers, in association with Pierce Management, Inc., and Robert R. Nathan Associates, Inc.

5P-397

8/12/55

SEAPORTS OF BURMA
(Outports)

A. DEPARTMENTAL AND COMPREHENSIVE REPORT RECOMMENDATIONS AND ACTIO TAKEN BY "CONFERENCES ON PROGRAM OF DEVELOPMENT AND RECONSTRUCTION, 15-22 FEBRUARY, 1954".

1. All the recommendations of the KTAM Comprehensive Report had been accepted by a previous report or otherwise, without explicit refer during the conference, except one. The recommendation to undertake hyd lic model tests for the port of Bassein was accepted at the conferences with the provise that the model tests be included within the terms of reference of consulting engineers.

2. The recommendations of the KTAM Comprehensive Report are listed below:

a. Akyab:

(1) Purchase additional service craft and pilot vessels.
(2) Purchase additional maintenance equipment.
(3) Undertake additional channel and port clearance.
(4) Install additional aids to navigation.
(5) Purchase cranes.
(6) Construct additional dockyard facilities.

b. Bassein:

(1) Purchase additional service craft and pilot vessels.
(2) Purchase additional maintenance equipment.
(3) Undertake additional river dredging and cutoffs.
(4) Install additional navigational aids.
(5) Undertake hydraulic model tests.
(6) Purchase cranes.
(7) Construct additional dockyard facilities.

c. [illegible]

(1) Purchase additional service craft and pilot vessels.
(2) Purchase additional maintenance equipment.
(3) Undertake additional river dredging and cutoffs.
(4) Install additional navigation aids.
(5) Undertake hydraulic model tests.
(6) Purchase cranes.
(7) Construct additional [illegible] facilities.

d. [illegible]

(1) Purchase additional service craft and pilot vessels.
(2) Purchase additional maintenance equipment.
(3) Undertake additional channel and port clearance.
(4) Install additional navigation aids.

e. [illegible]

(1) Purchase additional service craft and pilot vessels.
(2) Purchase additional maintenance equipment.
(3) Undertake additional channel and port clearance.
(4) Install additional navigation aids.
(5) Construct additional warehouses.
(6) Purchase cranes.
(7) Construct additional [illegible] facilities.

3. It was estimated that the above program would cost [illegible] over a [illegible] period.

[illegible]

1. The [illegible] Marine Department has adopted a capital program [illegible] of the rehabilitation of the existing flotilla of [illegible] employed for [illegible] patrol and conservancy. It has a compre-

year launch replacement program for construction of 326 new vessels of various types. Most of these will replace vessels currently in service which were obtained from the British Military Administration and which have completed their economic life and need replacement to cope with the expanding government administration. As originally planned, the program required procurement of 215 vessels from abroad and construction of 111 vessels in the Government Dockyard, Rangoon, between 1953 and 1958. The program was planned as follows:

TABLE I

TIME SCHEDULE OF VESSELS TO BE PROCURED FROM ABROAD

Type of Vessel	Year of Delivery and Number of Vessels					
	1953-54	1954-55	1955-56	1956-57	1957-58	Total
Motor Launches - 50'	4	7	7	7	14	39
" " - 55'	42	28	24	20	24	138
" " - 80'	12	6	2	2	3	25
L/A Class vessels 80'-100'	4	2	4	3	-	13
TOTALS	62	43	37	32	41	215

TABLE II

TIME SCHEDULE OF VESSELS TO BE CONSTRUCTED LOCALLY

Type of Vessel	Year of Delivery and Number of Vessels					
	1953-54	1954-55	1955-56	1956-57	1957-58	Total
Motor Launches - 50'	3	-	-	-	-	3
" " - 55'	4	12	16	20	24	76
" " - 80' [illegible])	[illegible]	-	-	-	-	[illegible]
TOTALS	[illegible]	12	16	20	24	111

Actual work on this program was started in 1952. In addition to new construction, the program calls for local conversion and modification of vessels currently in use by the Government. The total cost of the program is estimated at K 800 Lakhs.

The original Budget Estimate of K 335 Lakhs for 1953-54 was revised to K 218.89 Lakhs, due to non-delivery of vessels from abroad and slow progress of local construction projects. The 1954-55 Budget was also lowered to K 200 Lakhs (See Table III following):

TABLE III

BUDGET & REVISED ESTIMATES FOR 1953-54 & BUDGET ESTIMATE FOR 1954-55 (IN K LAKHS)

Capital Outlay	Budget Est. 1953-54	Revised Est. 1953-54	Budget Est. 1954-55
1. Purchase of new vessels	235.00	150.00	127.50
2. Erection of new vessels	75.00	36.05	20.00
3. Conversion of military craft	2.00		2.00
4. Shore Establishments & Workshop Plant & Machinery	20.50	32.84	18.00
5. Stores (net charge)	2.50		32.50
TOTALS	335.00	218.89	200.00

Total expenditures for 1953-54 were K 140.99 Lakhs, as indicated in Table IV.

TABLE IV

SUMMARY OF CAPITAL EXPENDITURES FOR 1953-54 (IN K LAKHS)

Capital Expenditures 1953-54	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total	Pct. of Orig. Budget Est.
1. Purchase of new vessels	10.40	33.47	22.90	56.74	123.51	53
2. Erection of new vessels	1.08	1.50	4.27	2.04	8.89	12
3. Conversion	[illegible]	.31	1.02	.05	2.02	101
4. Plant & Machinery	-	-	1.77	4.80	6.57	33
5. Stores	-	-	-	-	-	-
TOTALS	[illegible]	35.28	29.96	64.08	140.99	42

By the end of 1952-53, Mercantile Marine Department had ordered 103 vessels from abroad and 26 were under construction in Dawbon Dockyard. Of these, 15 vessels from abroad were received during 1952-53.

During 1953-54, contracts for 4 more "T" Class vessels were placed with firms in the United Kingdom. These four "T" Class vessels have been handled over to I.W.T.B. by M.M.D., by order of Government. It is planned to replace these for Government later. Thirty more vessels were received from abroad and three from the local dockyard during 1953-54.

The total of delivered vessels by the end of the year was 48, thus ending the year 1953-54 with a backlog of 62 vessels from abroad and 25 from the local dockyard. Delay in supplying teakwood for vessels to foreign contractors and sluggish labor activity at the local dockyard contributed to the backlog.

The above program does not indicate any breakdown of vessel requirements by outports but the requirements of each outport have been considered.

2. Other work, completed or in progress, and recommended in the KTA Comprehensive Report, consists of the following:

a. Akyab:

(1) Repairs to Main Jetty, Stone Pier Jetty and Lessar Jetty.

(2) Two new sheds constructed at "T" head of Main Jetty.

(3) New Port Officer's Garage.

(4) Dredging in progress off Main Jetty.

(5) Construction of Nissen hut godown for Port Stores.

b. Bassein: There are no major requirements which have not been met or for which planning is not underway. The following work has been accomplished:

(1) Repairs to Strand Road, Mosque Road and Victoria Street Jetties, [illegible] Jetty and P[illegible] Jetty.

c. Moulmein: At the Port of Moulmein, most of the outstanding requirements either have been accomplished, are in the process of completion, or are planned for early execution. The following work has been accomplished.

(1) Maingay Jetty Pontoon repaired.

(2) Repairs to Mission Street Jetty.

(3) Dredge "Salween" deepening Lady Clifford Channel.

(4) Lit buoys were laid in the channel from Goodwin to Halfway

(5) Extensive repairs to the Main Jetty were begun.

d. Tavoy: In the Port of Tavoy, there are no major outstanding rehabilitation requirements which have not been completed, or for which planning is not underway. The Port Fund Jetty has been repaired and is being maintained.

e. Mergui: The plans of Mercantile Marine Department, local port authorities and the District Commissioner are adequate for the needs of the harbor. However, much work remains to be accomplished. The following has been accomplished:

(1) Completed clearance of underwater obstructions off Naukle and Main Jetties.

(2) New Market Beacon constructed.

(3) Masonry Bridge built on Seiknge Foreshore.

(4) Small wooden Jetty constructed at Naukle Foreshore.

C. COMMERCE:

1. **Akyab:** Seaborne commerce for Akyab is listed in Table V.

TABLE V

ANNUAL SEABORNE COMMERCE - AKYAB

Year	Imports (Misc. Cargo) (Long Tons)	Exports (Misc. Cargo) (Long Tons)	Exports (Rice & Rice Products) (Long Tons)	Total Commerce (Long Tons)
1949-50	10,747	739	78098	89584
1950-51	15,462	1284	84480	97226
1951-52	16,533	1350	105487	123390
1952-53	19,359	1434	112445	133238
1953-54	31,977	2019	106781	140777

Table V indicates a very slow recovery in commerce, as compared to prewar. In the period from 1924 through 1941, Akyab averaged about 230,000 long tons of commerce annually, varying from a low of about 170,000 tons in fiscal year 1925-26 to a high of about 279,500 tons in 1933-34.

Monthly seaborne commerce for the period June 1952 - Sept. 1954 is given in Table [illegible].

2. **Bassein:** The export of rice and rice products for the period 1949 to 1953 is listed in Table VI.

TABLE VI

ANNUAL EXPORT OF RICE AND RICE PRODUCTS - BASSEIN

Year	Export of Rice and Rice Products (Long Tons)
1949	285,790
1950	206,056
1951	131,276
1952	166,118
1953	146,427

The export in 1949 included a large amount of the storage from the previous year. The decreases in the following years are due to the reduction of paddy in cultivation as a result of insurgent activity and increases in local consumption due to population increases.

Monthly seaborne Commerce for the period June 1952 - Sept. 1954 is given in Table VIII.

It is noted from the above table that the export of rice and rice products for fiscal year 1953-54 has risen to 234,949 long tons, and the annual traffic amounted to 238,683 long tons. This shows considerable increase over the previous four years but is still below the average of 315,650 long tons attained during the 10 years prior to the war.

3. Moulmein: Moulmein Port has completely recovered from the effects of the last war, as evidenced by a total waterborne commerce of 291,372 long tons for fiscal year 1953-54, greater than in any previous year. From 1924 through 1941, commerce at the Port of Moulmein averaged 168,000 long tons, varying from a low of 134,250 tons in 1925-26 to a high of 254,000 tons in 1939-40. During the period 1949-52, the export of rice was about 105,000 tons in 1949, about 91,800 tons in 1950, about 100,500 tons in 1951, and about 103,800 tons in 1952. The previous maximum export of rice and rice products of 168,000 tons in 1938, was exceeded when 184,911 tons were exported in 1953-54.

Monthly seaborne Commerce for the period June 1952 - Sept. 1954 is given by Table IX.

4. Tavoy: Seaborne commerce at the Port of Tavoy has not improved since the war. Annual waterborne commerce for the periods 1949-50 to 1953-54 is given by Table X.

TABLE X

ANNUAL SEABORNE COMMERCE - TAVOY

YEAR	TOTAL TONNAGE
1949-50	19,009
1950-51	30,002
1951-52	-
1952-53	16,610
1953-54	15,155

Monthly seaborne commerce for the period June 1952 - Sept. 1954 is given by Table XI.

As previously stated in the KTAM Comprehensive Report, the Port of Tavoy serves a rather restricted area of low potential agricultural use and any appreciable increase in export commerce will depend on the development of natural resources and minerals in the trade area. Up to the present (April 1955), there has been no material development of natural resources and minerals and waterborne commerce continues on a small scale.

5. **Mergui:** Since the war, Mergui has shown a marked increase in activity, with commerce in 1953-54 being over twice the estimated high for the prewar period. The annual seaborne commerce for the period 1949-50 to 1953-54 is given in Table XII.

TABLE XII

ANNUAL SEABORNE COMMERCE - MERGUI.

YEAR	EXPORTS	IMPORTS	TOTAL
1949-50	19,989	14,185	34,174
1950-51	25,163	23,911	49,074
1951-52			
1952-53	22,305	22,019	44,334
1953-54	28,815	27,963	56,778

Monthly seaborne commerce for the period June 1952 - Sept. 1954 is given by Table XIII.

D. RECOMMENDED FUTURE ACTION

1. The Capital Program, for procurement of vessels from abroad and construction in the Government Dockyard, be continued and expedited.

2. It is recommended that action be taken at each outport as follows;

a. Akyab:

(1) Port facilities maintenance and rehabilitation be continued and expedited.

(2) Maintenance dredging be continued to keep the Main Jetty open for ocean-going vessels.

(3) Cherogeah creek should be dredged and kept open.

(4) Marine repair should be consolidated in one dockyard.

(5) The wharf cranes necessary to accelerate cargo handling be purchased.

(6) A study be initiated on the feasibility of mechanisation of facilities used to handle paddy from country boats to the mills and bagged rice from the mills to the lighters. The study should be undertaken by M.M.D. with collaboration of S.A.M.B.

b. Bassein:

(1) Port facilities maintenance and rehabilitation be continued.

(2) S.A.M.B. investigate the possibility of connecting the jetties directly to the warehouses by trestles, and of using hand or platform trucks to transport the rice bags from the warehouse directly to the jetty.

(3) Centralization of rice shipments should be planned against the time when rice exports again reach and exceed the prewar level, and amounts to about 300,000 tons per year. This should consist of the construction of the proposed S.A.M.B. warehouses and a wharf for seagoing vessels adjacent to the proposed warehouses.

(4) Dredging be initiated at the cutoffs proposed in the KTAM Project Report, and the sharp bends in the entrance channel be eased.

(5) Maintenance dredging be continued at bar and shoal areas to provide safe navigating depths.

(6) Hydraulic model tests be initiated to investigate possible use of river-training facilities to minimize annual maintenance.

c. Moulmein:

(1) Hydraulic studies be initiated to determine the practicability of using training walls to direct the river flow and minimize maintenance dredging.

(2) The laying of lit buoys in the entrance channel be completed to permit night navigation.

(3) Marine repair facilities be consolidated into one unit, under the direction and operation of the proposed Department of Yards and Docks.

(4) The use of hand or platform trucks for the transport of bags from the godowns at Martaban to the end of the jetties be considered.

d. Tavoy:

(1) The use of training walls to minimize dredging be investigated by model studies.

e. Mergui: The planning of the Mercantile Marine Department, local port authorities and the District Commissioner should be implemented. This includes:

(1) Extension of Main Jetty, a minimum of 120 feet to deeper water, and the installation thereon of a 6-ton crane.

(2) Construction of a new customs godown, warehouse, and Port Offices structures.

(3) Dredging of harbor and entrance channels.

(4) Removal of the wreck of the large freighter in the anchorage area of the Great Tenasserim River.

E. CONCLUSIONS

The Nautical Adviser and Principal Officer, Mercantile Marine Department of the Ministry of Transport and Communications, supervises the outports, however, as the ports are operated on local funds, final decision on the utilization of these funds rests with the local Port Officer and the District Commissioner, guided by a local Port Advisory Board.

In order to expedite the work at the outports recommended for accomplishment in paragraph C 2, it is recommended that responsibility for accomplishment of this work be vested in M.M.D. and funds for same be made a part of the M.M.D. Budget. This will release local funds for purely maintenance projects, during the execution of the recommended work by technically qualified M.M.D. personnel. There is precedent for this as work has been done at the outports, under the supervision of M.M.D., utilizing M.M.D. funds.

MONTHLY SEA

MONTH	IMPORTS				
	Coastal				
	Paddy	Cocoanut	Groundnut	Dried Fish	Gunny
June 1952					
July					
Aug					
Sept					
Oct					
Nov	185	90	25		
Dec	56	30	6		
Jan 1953	30	50	7		
Feb					
Mar					
Apr	200	70	-	25	
May	25	20			
June					200
July					
Aug					
Sept					
TOTALS: 10/52-9/53	496	260	38	25	200
Oct	10	200			
Nov	260	25	10		
Dec	162	160	1¼		
Jan 1954	44	300		3	
Feb	40	275		2 3/4	
Mar	70	350		5	
Apr	*30	* 50	*4		
May					
June		15			
July					
Aug					
Sept					
TOTALS: 10/53-9/54	616	1375	15¼	10 3/4	-

* Imports - 84L.T., Exports - 24,736 L.T., breakdown

TABLE VIII

MONTHLY SEABORNE COMMERCE-BASSEIN

(Long Tons)

IMPORTS				EXPORTS				
Coastal				Seagoing		Coastal		
Groundnut	Dried Fish	Gunny Bags	Salt	Rice	Bran	General	Potatoes	Tobacco
				8013				
				7999				
				22254	387			
				15610	983			
				10700	957			
25				26874	995			
6				18439	598			
7				7325	-			
				550	3334			
				13086	2233			
-	25			5250	1334			
		200		30171	-			
				15466	1455			
				13549	-			
				8750	2879			
				4329	-			
38	25	200		154489	13785			
				10826	1875		30	1
10				10307.69	-	½	20	5
1½			116½	13777.15	-		1	1½
	3		10½	9869.09	363.43		1500	½
	2 3/4		10	9244	2995			
	5		20	30378	2956			
*4				*23000	*1756			
				13671				
				25555				
				26040	2571			
				11962	2831			
				33972				
15½	10 3/4	-	157	218601.93	16347.43	½	1551	8

*Exports - 24,756 L.T., breakdown estimated.

MONTHLY SEA

MONTH	IMPORTS					
	Seagoing		Coastal			
	General	POL	General	Timber	Paddy	G
June 1952	382	414 3/4	1,846	-	-	
July	106	1,286	1,602	2	-	
Aug	342	591	2,129	-	-	
Sept	390	644	2,030	-	-	
Oct	160	397½	2,265	5	-	
Nov	134¼	776½	1,495¼	-	-	
Dec	206	647½	2,670¼	-	3/4	
Jan 1953	-	820	2,432	-	-	
Feb	277	2,621	-	-	-	
Mar	316½	1,484	3,026	15 3/4	7½	
Apr	42	1,273	1,843	-	-	
May	258	702	2,554	27	-	
June	147	739½	2,721	-	-	
July	567	1,219	2,202	-	-	
Aug	564	514½	2,042	23 3/4	-	
Sept	241	551	2,397	35½	-	
TOTALS: 10/52-9/53	2,912 3/4	11,745½	25,647½	107	8¼	1,
Oct 1953	35	509	2,277	18	-	
Nov	6	704 3/4	2,194	24½	-	
Dec	936	1,622	1,700	5½	-	
Jan 1954	1,919	820	2,686½	5	80	
Feb	2,059	1,235¼	3,606	23½	-	
Mar	3,066	742¼	4,024	9	30	
Apr	119*	1,400*	3,600*			
May	113	620	3,514	31½	-	
June	724	491 3/4	3,552½	27½	-	
July	127	1,204	4,223	-	-	
Aug	468	1,381	3,864	6 3/4	-	
Sept	310	1,461	3,424	-	15	
	9,882	12,191	38,665	151¼	125	1,

* Total imports - 5,119 tons, Total exports - 39,5

TABLE IX

M O N T H L Y   S E A B O R N E   C O M M E R C E - M O U L M E I N

(long tons)

	ORTS			EXPORTS							
	Coastal			Seagoing				Coastal			
	General	Timber	Paddy	General	Rice	Timber	Rubber	General	Rice	Timber	Rubber
	1,846	-	-	165	3,486¼	2,033¼	288	1,168	834¼	136 3/4	-
	1,602	2	-	174	5,092½	¼	66	715	428	193	4
	2,129	-	-	133	10,489	355½	43	598	416½	231½	-
	2,030	-	-	96	-	10	10½	797	884	316	-
	2,265	5	-	36	2,386¼	5	108	916	195 3/4	193½	-
	1,495¼	-	-	163	11,286	-	-	716	789	674¼	55
	2,670¼	-	3/4	77	10,091½	908½	625	1,042	687½	98½	40
	2,432	-	-	137	-	520½	324	1,030	647	235 3/4	92½
	-	-	-	6½	2,325	52½	294½	1,352	932 3/4	223¼	131 3/4
	3,026	15 3/4	7½	107½	16,354½	-	377½	1,859½	854¼	175	52½
	1,843	-	-	101	12,461½	-	18	1,506	580 3/4	246 3/4	482½
	2,554	27	-	85½	7,829¼	5½	211½	1,865	538¼	449¼	236 3/4
	2,721	-	-	-	53½	1,557½	281½	1,721	757½	196½	1
	2,202	-	-	204	7,630½	518	248	1,332	780 3/4	331	-
	2,042	23 3/4	-	89	7,823½	36	17½	1,062	497¼	273 3/4	-
	2,397	35½	-	16	2,900	1,534¼	12½	1,593	688	207	-
	25,647½	107	8¼	1,022½	81,141½	5,137 3/4	2,518	15,994½	7,948½	3,304½	1,092
	2,277	18	-	57	3,091	3	93½	2,522	953	152	4
/4	2,194	24½	-	89	855	1,350 3/4	396 3/4	2,559½	942¼	212½	6
	1,700	5½	-	156	7,743	74 3/4	423½	2,805	839 3/4	264 3/4	4
	2,686½	5	80	-	4,646	1,288	620	2,749	1,238 3/4	338 3/4	-
	3,606	23½	-	96	10,418 3/4	1,058¼	745½	2,049	1,158 3/4	535	4
	4,024	9	30	85	31,251¼	796	222½	2,799	1,774	951½	9 3/4
	3,600*			100*	35,543½	900*	300*	1,350*	900*	450*	-
	3,514	31½	-	178	27,377¼	405	367	1,400	1,070 3/4	482¼	90
/4	3,552½	27½	-	121	5,577½	-	349	1,715	1,085	599½	106½
	4,223	-	-	246	11,976 3/4	334	185	2,118	1,290½	634½	-
	3,864	6 3/4	-	133	8,634 3/4	608	31½	2,406	1,035 3/4	638¼	-
	3,424	-	15	85	24,835½	-	15	3,021	672¼	961¼	
	38,665	151¼	125	1,346	171,950¼	6,817 3/4	3,749¼	27,493½	12,960 3/4	5,[illegible]0¼	220

- 5,119 tons, Total exports - 39,543½ tons - breakdown estimated.

TABL

MONTHLY SEABORNE

(Long To

MONTH (24th to 23rd of)	IMPORTS		
	Seagoing		
	POL	General	POL
June 1952	-	31¼	215
July	230	-	-
Aug	250	43	-
Sept	190	85	-
Oct	-	44	-
Nov	419	7	-
Dec	200	122	-
Jan 1953	320	18	56
Feb	230	5	-
Mar	140	13	70
Apr	250	69	100
May	-	17	-
June	-	29	-
July	200	46	-
Aug	180	13	-
Sept	175	84	-
TOTALS: 10/52-9/53	2114	467	226
Oct 1953	120	2	-
Nov	-	3	-
Dec	220	-	-
Jan 1954	313	51	-
Feb	323	17	-
Mar	200	5	-
Apr	171*	47*	68*
May	-	30	15
June	-	674	580
July	300	27	-
Aug	150	2	-
Sept	220	141	-
TOTALS: 10/53-9/54	2017	999	663

* Total Imports - 782 Tons, Exports - 1[illegible]1 Tons

TABLE XI

MONTHLY SEABORNE COMMERCE - TAVOY

(Long Tons)

IMPORTS				EXPORTS			
Seagoing		Coastal		Seagoing		Coastal	
POL	General	POL	General	POL	General	POL	General
-	31½	215	307	-	257	-	57
230	-	-	487	-	129	-	72
250	43	-	465	-	347	-	152
190	85	-	495	-	320	-	20
-	44	-	513	-	248	-	50
419	7	-	579	-	301	-	68
200	122	-	915	-	174	-	350
320	18	56	537	-	608	409	166
230	5	-	278	80	582	80	248
140	13	70	628	-	329	-	753
250	69	100	728	-	202	-	797
-	17	-	699	-	230	-	614
-	29	-	348	-	127	-	349
200	46	-	334	-	289	-	139
180	13	-	281	-	199	-	98
175	84	-	267	-	140	-	66
2114	467	226	6107	80	3429	489	3698
120	2	-	722	-	188	-	166
-	3	-	962	-	193	-	153
220	-	-	622	-	152	-	200
313	51	-	548	74	-	-	135
323	17	-	611	-	230	-	452
200	5	-	712	-	323	-	339
171*	47*	68*	496*	-	92*	-	104*
-	30	15	409	-	402	-	218
-	674	580	117	-	157	-	223
300	27	-	413	-	120	-	93
150	2	-	671	-	281	-	106
220	141	-	298	-	400	-	94
2017	999	663	6581	74	2538	-	2283

al Imports - 782 Tons, Exports - 191 Tons - breakdown estimated

MONTHLY SEABORNE COMMERCE - MERGUI

(Long Tons)

MONTH	IMPORTS				EXPORTS		
	Seagoing		Coastal		Seagoing		Coastal
	General	P O L	General	Rice	General	Rubber	General
June 1952	46	-	1227	139	356	44	861
July	34½	300	901½	638	460	65	470
Aug	83½	578	463½	764	225	32½	528½
Sept	44	-	742	1017	105	2	1033
Oct	58	80	677½	205½	186	34	1222
Nov	40½	457	1015 3/4	787	437	550	651
Dec	70½	280	1329	978½	81	852	1500
Jan 1953	24½	170	1369½	525½	143½	533	1991½
Feb	60	283	1092	1209½	240	612	1162
Mar	50*	300*	878*	1000*	400*	600*	2024*
Apr	34½	200	956	607½	382½	304	1478½
May	32	-	1068	518½	977½	582	514½
June	42	105	508½	652½	262	176	1100
July	40¼	510	634¼	539	186	189	973
Aug	20	-	549½	116½	222	151	559
Sept	94¼	-	768	1092	88½	68	872½
TOTALS: 10/52-9/53	566½	2385	10846	8232	3606	4651	14047 3/4
Oct 1953	50½	517	1128½	815	26	99	1461½
Nov	106	-	1893½	855½	450	280	1494
Dec	27	150	1455 3/4	1264 3/4	124½	950	1972
Jan 1954	32 3/4	275	1050½	1099	160	309	2529
Feb	42	4	1032	602	605	627	2002
Mar	38	275	1422	745	933	485	2228½
Apr	60*	265*	1300½*	869*	425*	338*	1646*
May	56½	-	1207	687	740	608	2273½
June	120	180	865	1032	45	258	1412½
July	60 3/4	157	1001½	1115½	17	275	1211
Aug	32¼	320	993	1027½	82½	6	848
Sept	90	260	1121	271	66½	1	925
TOTALS: 10/53-9/54	715 3/4	2403	14470¼	10373½	3674½	4238	2[illegible]08 3/4

* Total of imports and exports correct, breakdown estimated.

GOVERNMENT OF THE UNION OF BURMA

MINISTRY OF NATIONAL PLANNING AND RELIGIOUS AFFAIRS

COMPREHENSIVE DEVELOPMENT PLAN

Supplement, September 30, 1955

OCEAN SHIPPING

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A. Departmental and KTAM Comprehensive Report Recommendations.

B. Action by Implementing Agencies.

C. Additional Action Taken By Implementing Agencies.

D. Recommended Future Action.

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10/11/55 (8-12)

OCEAN SHIPPING

A. The K.T.A.M. Comprehensive Report concurred in the reports of the Nautical Adviser concerning ocean shipping and recommended that the operation of the proposed services be placed under a separate agency or maritime board. This was accomplished with the formation of the Union of Burma Shipping Board.

B. ACTION TAKEN BY IMPLEMENTATION AGENCIES

The capital program of the Union of Burma Shipping Board for FY 1953-54 consisted of:

1. Construction of four new sea-going vessels, two of 1050 gross tonnage each to carry passengers and cargo, and two of 8000 tons each for cargo only.
2. Purchase of ancillary transport and facilities such as motor launches, tugs, pontoons, etc.
3. Construction of staff quarters and godowns.
4. Purchase of supplies and equipment for ships.

The status of the capital program is given in the table following:

CAPITAL PROGRAM OF UNION OF BURMA SHIPPING BOARD

Sr. No.	Project	Project Description	Expdtr FY 1953/54	B.E. 1954-1955	Expenditures		Physical Progress
					Oct/Dec 1954	Jan/Mar 1955	
1.	New Passenger Vessels	Two passenger vessels under construction in Scotland since 1951. These vessels will operate the coastal passenger service upon completion. One vessel scheduled for delivery in August 1954 and another in Nov 1954.	17.60	23.00	8.80	18.28	Contractors could not meet schedules and have requested further extension of delivery dates to April & July 1955 respectively. Explanation for delays is awaited from the Agency's representative in the U.K. Excess of payments over budget estimates due to short falls in the previous year and will be adjusted in the revised estimates.
2.	New Cargo Vessels	Built at Hamburg, West Germany for the Indo-Burma Service capacity 8,000 tons (gross) each.	92.92	9.00	-	-	Both vessels delivered and in operation. Residual payments still remains to be finalized.
3.	Purchase of ancillary transport and facilities.	Covers purchase of motor launches pontoons, etc., for ship to shore operations and for rehabilitation of the Arakan Section fleet.	.43	35.00	.46	-	Project for procurement of 43 vessels for the Arakan Section being planned and awaiting Government approval as to method of procurement.
4.	Inventories	Covers purchase of ships' supplies and equipment.	.73	10.00	.99	.38	
5.	**Office furniture and fittings**		-	.50	.03	.04	
			111.68	77.50*	10.28	18.70	

* **Excludes K .30 Lakhs provision for loans and advances to staff, also unadjusted for capital recoveries from resale of coal and other ships' supplies totalling K 5.13 lakhs.**

C. ADDITIONAL ACTION TAKEN BY IMPLEMENTING AGENCIES

A program has been initiated to train Burman nationals for the key positions, such as Master, First Officer and Chief Engineer, on vessels of the Union of Burma Shipping Board.

High School graduates are picked by the Ministry of Transport and Communications, with the advice of the Nautical Adviser; then tested and interviewed before acceptance as Cadets. Approximately 15 are chosen each year.

The cadets are sent to Southampton College in England for one year's study. The successful students are then sent to sea on British ships for 3½ years. After completion of the sea duty, the cadets are permitted to sit for their Second Mate and Second Engineer Licenses. They then serve on vessels of the Union of Burma Shipping Board as Third Mates and Third Engineers, to gain experience and work their way up to the key positions on board ship.

At the present time, England will not issue Master and Chief Engineer Licenses to non-nationals, however, they have permitted Burmans to sit for the licenses and notified the Government of the Union of Burma of the results. India permits Burmans to sit for Master and Chief Engineer Licenses.

D. RECOMMENDED FUTURE ACTION

1. The combined use of Southampton College and training aboard British ships is adequate to meet the present requirements for training of Burmese nationals to serve as officers on Burmese ships. When maritime trade increases warrant large increases in the Burmese maritime fleet, consideration should then be given to establishment of a maritime training school in Burma.

2. A study should be made of the Indo-Burma rice - coal trade to determine when additional vessels will be required.

3. A study should be made of the privately carried coastal passenger service, both pre-war and up to date, to determine future growth and future requirements for additional passenger vessels.

IBRD

Government of the Union of Burma

\Burma.

Ministry of National Planning/and Religious Affairs

Comprehensive Development Plan

Supplement, (September 30, 1955)

[pt. 3]

INLAND WATERWAYS

CONTENTS

A. Conference Action on 1953 Report
   1. Recommendations, 1953

B. Action by Implementing Agencies
   1. River Conservancy
   2. Marine, Shipbuilding and Repair Facilities
   3. Arakan Flotilla
   4. Rehabilitation of I.W.T.B. Fleet
   5. Dockyard of Dalla, Mandalay, Myingyan
   6. Personnel Training Program
   7. Improvement of River Ports
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   9. Push-tow tugs and Barges

C. Recommended Future Action

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INLAND WATERWAYS

A. DEPARTMENTAL AND COMPREHENSIVE REPORT RECOMMENDATIONS AND ACTION TAKEN BY "CONFERENCES ON PROGRAM OF DEVELOPMENT AND RECONSTRUCTION, 15-22 FEBRUARY, 1954"

1. Departmental and KTAM Comprehensive Report Recommendations, with action or comment of the conferences, are listed below. Those recommendations listed without comment are accepted. The Ministry of Transport and Communications, the Inland Water Transport Board, the Mercantile Marine Department, and the Board of Management Port of Rangoon are the responsible agencies.

a. "The Inland Water Transport Board is a transport agency and should not be engaged in river conservancy operations". This was not accepted. The conferences agreed that I.W.T.B. should be responsible for conservancy of inland waterways where it operates, M.M.D. for channels within its jurisdiction, and B.M.P.R. for the Port of Rangoon. It was further agreed that appropriate model tests would be placed within the terms of reference of the consulting engineers to be engaged in connection with the Ports and Waterways program.

b. "All marine shipbuilding and repair facilities should be merged under one department, the Department of Yards and Docks, and be administered through the Ministry of Transport and Communications". This was accepted at the conferences, however, the agencies involved are not completely in favor of this step as they believe it will lengthen the lay-up time of their craft.

c. "The Government should acquire the Arakan Flotilla Company Ltd., and incorporate it in the Inland Water Transport Board". Acquisition had been accomplished prior to the conferences.

d. "The I.W.T.B's 3-year and 10-year programs for rehabilitation of its fleet, together with a similar plan for rehabilitation of the river conservancy fleet is concurred in and should be prosecuted vigorously". The recommendation to increase the general cargo and passenger flotilla, the flotilla for the Kalewa coal trade, and for petroleum transport was accepted.

e. The recommendations for shore facilities construction, including expansion of dockyard facilities at Dalla and Mandalay, and establishment of dockyard facilities at Myingyan industrial site, were accepted at the conferences.

f. "To relieve the friction developed by misunderstandings with labor and to improve technical skills, educational instruction and training should be systematically provided". The personnel training program, as proposed by KTAM in the Comprehensive Report, was accepted at the conferences.

g. "Facilities for landing, cargo handling and storage, at the main river ports on the Irrawaddy and Chindwin Rivers, should be improved insofar as justified by the increase in commerce requirements". This recommendation was accepted at the conferences.

h. "When the Kalewa coal and Myingyan industrial projects are developed most bulk products should be transported by water". This was accepted at the conferences, however it does not reflect the opinion of all governmental transportation agencies.

i. "Before I.W.T.B. invests too heavily in replacing their tow-boats, experiments should be made with trial tows, using the available plant and converted equipment, to determine whether push towing of large enough units can be used on the rivers". This recommendation was accepted at the conferences.

B. ACTION TAKEN BY IMPLEMENTING AGENCIES

1. At the present time, I.W.T.B. is accomplishing a bare minimum of maintenance work on the Chindwin and Irrawaddy Rivers, marking the channels, removing snags and constructing bhandals when labor and funds are available. No comprehensive plan for river conservancy work on the Chindwin and Irrawaddy Rivers has been developed by I.W.T.B., or any other governmental agency. Even the maintenance of the rivers has been hindered by lack of funds.

2. No progress has been made towards the establishment of a Department of Yards and Docks to handle all marine shipbuilding and repair. During the reparations meetings in Japan, August-September 1954, several firms were contacted concerning a joint venture, with the Government of the Union of Burma, for the construction of a drydock, shipbuilding and repair yard, and general engineering workshop for steel fabrication. "Ishikawa Jima Heavy Industries" and "Hitachi Shipbuilding Co. Ltd." both have sent representatives to Burma to investigate the possibilities of the joint venture. A shipyard site has been tentatively selected and limited foundation exploration has been performed. Negotiations to date have been handled by the Ministry of Industry.

3. The Arakan Flotilla was nationalized on 1 October 1953 and is being run by the Union of Burma Shipping Board (Arakan Section).

4. The overall shipbuilding program is of 10 years duration, from 1952 to 1962. The program requires replacement of some 50 percent of the existing fleet of 585 war surplus vessels and constructions of additional new vessels with a view of raising the gross fleet tonnage to the pre-war level of 140,946 tons. The program is estimated to cost over K 50 crores. Since 1952, a 3-year program has been in progress, with some 60 vessels on order from abroad. A further extension has been made to this in 1954 when the I.W.T.B. ordered some 139 vessels, including 36 for the BOC oil traffic

through the 1954 Purchase Mission. This program is summarized in Table I.

A supplementary program for 63 vessels, costing K 217,000 lakhs was recommended for the period 1956-57 to 1959-60. Procurement could be made through Japanese Reparations, or from any country through the barter exchange system. This additional program is summarized on Table II.

TABLE I

INITIAL I.W.T.B. SHIPBUILDING PROGRAM

Item		No Rgd	Revised B.E. 1954 - 1955		Requested 1955 - 1956		Total amount involved	Total F.E. involved
			total	F.E.	total	F.E		
'S' Class vessels	(1)	50	109.7	70.2	59.9	26.1	233.5	160.3
'H' Class vessels	(1)	4	16.2	10.7	17.9	—	34.1	10.7
Oil flats	(2)	6	1.6	1.6	24.7	14.3	26.3	15.9
Diesel tow tugs	(4)	6	47.4	45.9	231.1	185.3	278.5	231.2
Pusher barges	(4)	30						
Craft for general river service	(3)	70	78.0	76.2	412.4	295.6	490.4	371.8
Craft for lighterage service	(5)	15	—	15.6	7.2	29.0	51.8	44.6
Small river tugs	(6)	3	2.8	2.8	2.6	1.9	5.4	4.7
Cargo barges	(6)	15	7.7	7.7	5.1	7.3	15.0	12.8
Buildings			5.9	1.0*	19.0	4.0*		
TOTALS		199						

NOTES: (1) 1953 Purchase Mission commitments, contract signed, fund sanctioned.

(2) 1953 Purchase Mission commitments, tender accepted, fund sanctioned.

(3) 1954 Purchase Mission commitments, tender accepted, fund sanctioned.

(4) Direct purchase by I.W.T.B. vessels for BOC oil traffic contract fund sanctioned.

(5) 1954 Purchase Mission commitments, tender accepted, fund not sanctioned yet.

(6) 1954 Purchase Mission commitments, contract signed, fund not sanctioned yet.

* Rough estimate.

TABLE II
SUPPLEMENTARY IWTB SHIPBUILDING PROGRAM

Description	No. Reqd.	Total Amount Invlvd	Total F.E. Invlvd	Payment due 1956-57		Payment due 1957-58		Payment due 1958-59		Payment due 1959-60	
				Local	F.E.	Local	F.E.	Local	F.E.	Local	F.E.
Galvanized steel cargo barges (s)	30	48.00	40.00	-	20.00	-	20.00	8.00	-	-	-
Galvanized steel cargo barges(L)	25	47.00	40.00	-	20.00	-	20.00	7.00	-	-	-
Paddlers (L)	3	83.00	69.00	-	-	-	34.00	14.00	35.00	-	-
Traffic harbor tugs (steam)	2	11.00	10.00	1.00	10.00	-	-	-	-	-	-
Powered water barges	2	11.00	10.00	1.00	10.00	-	-	-	-	-	-
Floating Dock for Mandalay	1	17.00	15.00	-	-	-	-	-	9.00	2.00	6.00
		217.00	184.00	2.00	60.00	-	74.00	29.00	44.00	2.00	6.00

5. Shore facilities construction, by I.W.T.B. in Rangoon, has been conducted on an annual basis, with individual projects presented annually for initiation during the budget year. For FY 1953-54 projects were reported for: a dispensary at Rangoon Foundry; sanitary facilities at Rangoon Foundry; sanitation facilities at Dalla Dockyard; the extension of the diesel workshop at Dalla Dockyard; a new fitting shop at Dalla Dockyard.

For FY 1954-55, projects were reported for: construction of a jetty at Rangoon Foundry, Ahlone; construction of a rest shed for workmen at Dalla; construction of Durwans' quarters at Dalla; extension of fitting shop in Dalla Dockyard; construction of workmen's barracks in Rangoon Foundry.

I.W.T.B. recommended that a Japanese Survey Team work out a detailed program of dockyard rehabilitation. A rough estimate of necessary dockyard rehabilitation, prepared by I.W.T.B., is given in Table III.

TABLE III
IWTB DOCKYARD PROGRAM

escription	Total Amount Invlvd K	Total F.E. Invlvd K	Payment Due In 1954-55 K L	F	1955-56 K L	F	1956-57 K L	F	1957-58 K L	F	1958-59 K L	F	1959-60 K L	F
ockyard rehabi- itation(Dalla, ngoon Foun- ry,Mandalay oulmein)	125.0	120.0	-	-	-	-	-	-	-	40.0	-	40.0	5.0	40.0
uildings, land) jetties)	19.0	-	-	-	-	-	13.0 6.0		-	-	-	-	-	-
chinery	20.0	18.0	-	-	-	-	0.5	4.5	0.5	4.5	0.5	4.5	0.5	4.5
S.Bassein	4.5	1.0	0.5	-	1.0	-	2.0	1.0	-	-	-	-	-	-
TOTALS;	168.5	139.0	0.5	-	1.0	-	21.5	5.5	0.5	44.5	0.50	44.5	5.5	44.5

Purchase of stores and machinery for modernization and rehabilitation of Government Dockyards, Rangoon and Mandalay, is being accomplished by MMD.

Extensive expansion of shore facilities at Dalla and Mandalay, and establishment of dockyard facilities at Myingyan industrial site, are a requirement of the proposed riverine transport of Kalewa coal, Chauk petroleum and other bulk commodities. No comprehensive plan has been formulated for the expansion of these facilities.

6. I.W.T.B. initiated a program of training of technical personnel in Europe, the United States, Australia and elsewhere, however this program has not been fully developed, due in part to lack of funds.

7. No action has been taken to improve the facilities for landing and storage at the main river ports on the Irrawaddy and Chindwin Rivers.

8. Present rates indicate that rail transportation is cheaper than barge transportation in Burma. It is questionable that these rates reflect the actual costs of the two methods of transportation. However, I.W.T.B. is presently of the opinion that transfer of Kalewa coal from barge to rail at Monywa will result in lower transport costs to Rangoon.

9. The I.W.T.B. plan for rehabilitation of its fleet includes the purchase of power barges, pusher type diesel tugs and pusher type barges. However, the purchase of one push-tow tug and six pusher barges by the 1954 GUB Purchase Mission for use in the experiments was deferred in order to revise the specifications. It has meantime been determined that push-towing is suitable for use on the Irrawaddy and Chindwin Rivers and the plan to conduct experiments has been dropped. The original requirement for one push-tow tug and six push barges has been increased to six push-tow tugs and thirty pusher barges. Purchase of these vessels has been deferred, however, due to budgetary limitations.

C. RECOMMENDED FUTURE ACTION

1. River conservancy is more than the maintenance of an existing channel by occasional dredging, the removal of snags and wrecks, and the construction of bhandals when labor and funds are available. River conservancy is planned river improvement, through the use of training works such as training walls, spur dikes, permeable dikes, bank revetments and dredging, in order to construct and maintain a channel commensurate with the present and foreseeable future demands of riverine traffic.

The first step in a conservancy program for the Chindwin and Irrawaddy Rivers is to initiate surveys to obtain current data on the location, width and depth of the channels; the location of all obstructions to navigation; and on topography adjacent to the rivers.

Secondly, comprehensive plans for river conservancy should be drawn up, based on the present and future requirements of riverine traffic, using the data collected in the survey.

A consulting firm, experienced in riverine conservancy, should be retained for the survey and planning stages.

Actual implementation of the river conservancy plan should be accomplished by I.W.T.B. supplemented by the necessary additional personnel, utilizing funds specially appropriated for the work, in order not to cause other I.W.T.B. work to suffer.

In order to accomplish the recommended conservancy program, it is deemed necessary that an Engineer Assistant be appointed to the Manager, I.W.T.B., whose function shall be to expedite the various phases of the conservancy program and keep the Manager, I.W.T.B. informed as to progress. He shall work initially in close collaboration with the consulting firm on the recommended surveys and plans, then, be in charge of the actual implementation of the river conservancy plan.

2. Lack of a Department of Yards and Docks is costing the Government time and money in its various shipbuilding, maintenance and repair activities.

As stated hereinbefore the pertinent government agencies believe they can handle their own shipbuilding, maintenance and repair more expeditiously than a central government agency. This is not true. The Dawbon Dockyards delivered only 3 vessels out of 28 scheduled for construction during the two-year period 1952-54. This delay was attributed to "sluggish labor activity".

A tentative organization chart should be drawn up for a Department of Yards and Docks, to be set up under the Ministry of Transport and Communications. The functions of the Department and each of its Branches should be clearly defined. Using this as a basis, a series of conferences should be called by the Ministry of Transport and Communications, to include representatives of all governmental agencies that utilize, maintain and build ships. The agencies involved can then set up an organization that is fully able, both from a personnel and equipment standpoint, to satisfy all their requirements for marine shipbuilding, repair and maintenance.

3. It is considered imperative that the services of a consultant on dockyard facilities for shipbuilding, maintenance and repair, be obtained to make a detailed survey of existing facilities and plan the expansion required to care for the proposed increase in the government fleets.

4. The I.W.T.B. 3-year and 10-year programs for rehabilitation of its fleet and the river conservancy fleet should be checked regularly for progress in order to ascertain annual budgetary requirements.

5. Since a program is in full swing for the rebuilding of the general cargo and passenger fleet to prewar strength, I.W.T.B. will need additional qualified personnel regularly during the 10-year tenure of the program. As previously stated, contracts in the amount of K 379.68 lakhs have been let for the purchase of new barges, tugs, launches and paddlers. Such equipment should be run and maintained by

trained personnel. A manpower survey of existing ships' operating and maintenance personnel should be initiated immediately. The results of the consultant's survey of existing dockyard facilities, and his proposed program of expansion, and the plan for rebuilding the general cargo and passenger fleet should be studied together to determine the number of personnel required under each classification and the tempo of the program that will furnish trained personnel regularly in sufficient numbers to operate and maintain the growing fleet.

6. A detailed study should be made, by a qualified consultant, of the existing facilities for landing, cargo handling and storage at the main river ports on the Chindwin and Irrawaddy Rivers, and plans prepared for their improvement. Better facilities will result in shorter periods for loading and unloading of cargo, less cargo damage, and lowered riverine transportation costs.

7. It is highly improbable that the actual cost for the riverine transport of coal from Kalewa to Rangoon is more than the cost of transporting the coal from Kalewa to Monywa by river and trans-shipment to rail at Monywa, for transport to Rangoon. A detailed economic study, comparing costs for the two methods of coal transport, is not within the purview of this report, however, such a study is recommended. This would determine the more economic method of transportation and aid in setting equitable rates.

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GOVERNMENT OF THE UNION OF BURMA

Burma.

MINISTRY OF NATIONAL PLANNING/AND RELIGIOUS AFFAIRS

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COMPREHENSIVE DEVELOPMENT PLAN

Supplement, September 30, 1955

[Ch. 4]

ELECTRIC POWER

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No. Ah Nya 826/00/55
Government of the Union of Burma
Ministry of National Planning &
Religious Affairs
No. 44 Kandawgalay House, Rangoon

Dated the 1 December 1955

Subject: Comprehensive Development Plan --
Transmittal of Supplement, " Electric Power"

Broad systematic planning for the development of the resources of the Union of Burma received its first major impetus with the presentation of the Pyidawtha Programme at the Union Conference in August 1952. This Programme was enlarged and strengthened by the completion in August 1953 of the more detailed "Comprehensive Report on the Economic and Engineering Development of Burma"*.

It is the present programme of this Ministry to enlarge and amend the Comprehensive Plan as rapidly as additional planning information and studies will permit. The accompanying supplement, entitled "Electric Power" , is therefore to be regarded as the current revision of this subject, amending and supplementing Chapter 19 of the Comprehensive Report of 1953 in the Government's Comprehensive Development Plan.

The official Comprehensive Development Plan of the Government may be considered to comprise at present the following reports:

1. Preliminary Report on Economic and Engineering Survey of Burma	January 1952
2. The Pyidawtha Conference (Resolutions and Speeches)	August 1952
3. Comprehensive Report on Economic and Engineering Development of Burma	August 1953
4. Summary of Proceedings -- Conference on Programme of Development and Reconstruction	Februaty 1954
5. Supplements:	
a. Telecommunications	September 1955
b. Electric Power	September 1955
c. Mineral Industries	September 1955
(Others in preparation)	

(Mo Myit)
Secretary
Ministry of National Planning
& Religious Affairs

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* Prepared under the auspices of the Ministry of National Planning with funds provided by the Technical Co-operation Administration (U.S.) by Knappen-Tippetts-Abbett-McCarthy, Engineers in association with Pierce Management Inc. and Robert R. Nathan Associates, Inc.

Government of the Union of Burma

Ministry of National Planning and Religious Affairs

Comprehensive Development Plan

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ELECTRIC POWER

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1. Recommendations, 1953

B. Action by Implementing Agencies

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12. Expansion of the Wetwun Hydroelectric Plant
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24. Long Range Planning
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C. Conclusions and Recommendations

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10/11/55

Government of the Union of Burma
Ministry of National Planning & Religious Affairs

Comprehensive Development Plan
Supplement, September 30, 1955

ELECTRIC POWER

A. DEPARTMENTAL AND COMPREHENSIVE REPORT RECOMMENDATIONS AND ACTION TAKEN BY "CONFERENCES ON PROGRAM OF DEVELOPMENT AND RECONSTRUCTION, 15-22 FEBRUARY 1954"

1. Departmental and KTAM Comprehensive Report Recommendations, with action or comment of the conferences, are listed below. Those recommendations listed without comment are accepted. The Ministry of Industry and the Electricity Supply Board are the responsible agencies.

a. Expedite the diesel electric program. In connection therewith the following considerations relating to transmission lines were recommended:

(1) Construct transmission structures suitable for later use with system networks.

(2) Provide for future double circuit lines.

(3) Consider the use of steel or concrete pole lines.

(4) Adopt 132 KV for primary transmission lines.

(5) Provide insulators suitable for near future loads.

b. Install outlying diesel plants (towns and villages)

c. Construct the Pegu hydroelectric system.

d. Construct the Myingyan steam plant

e. Construct the Saingdin Falls hydroelectric system.

f. Construct the Kalewa steam plant and extend the Kalewa mine transmission system.

g. Construct the Paunglaung hydroelectric plant.

h. Construct the Balu Chaung hydroelectric plant.

i. Construct the Lampha Chaung hydroelectric plant. This is subject to further investigation.

j. Construct the Mu River hydroelectric plant. This is a multi-purpose irrigation and power project. Acceptance is subject to resolution of the problem of religious sites in the reservoir area.

k. Construct the Magwe transmission system.

l. Construct the Prome transmission system.

m. Construct the Bassein transmission system

n. Construct the Thaton-Tavoy transmission system

o. Construct the Lashio transmission system

p. Investigate the possibilities of the Bawgata-Yunzalin hydroelectric projects.

q. Expand the Wetwun hydroelectric plant

r. Investigate the Zawgyi river

s. Investigate the Mantong and Nampang Falls in the Southern Shan States.

t. Investigate hydroelectric possibilities in the Chin Hills.

u. Investigate hydroelectric possibilities for the Bhamo-Myitkyina area.

v. Investigation and expansion of the Hpaungdaw hydroelectric plant, Tavoy.

w. Investigation and expansion of the Mogok hydroelectric plant

x. Expansion of the Mansam and Konnyaung Falls plants (Namtu).

y. Investigation of the Pyaungcho Rapids area for development power.

z. Rangoon Electric Supply Board System.

aa. Hydro projects on Shweli River.

bb. Establish a Hydrologic Division.

cc. Continue long-range planning.

B. ACTION TAKEN BY IMPLEMENTING AGENCIES

1. Diesel Electric Program. The extent of the present ESB program for dieselization, insofar as the larger units are concerned, is shown on Table I, page 7. The entire program can be divided roughly into the following parts:

The construction of six 2 and 3 x 1000 KW power stations that eventually, with the hydro stations and their high voltage transmission system, will serve large areas of Central Burma extending from Mandalay to Htaukkyan. Generally these six diesel districts will feed their loads thru 33KV transmission and 11KV distribution lines before stepping down to 400 volts. The one at Mandalay will feed only at 11KV to 11KV/400V substations.

The construction of a total of fourteen 2 x 500 KW and 2 and 3 x 250 KW power stations that will distribute power via 11KV lines generally to loads within a 15 to 20 mile radius of each generating plant, and a number of which will be later tied into and fed by the hydroelectric transmission system as that system is extended in the future to meet normal load growth. The station planned for Pyinmana will feed also into the 33KV system there initially. At the present time the design and construction work on these fourteen stations is being held up pending clarification of the financial situation. It is understood that the Electricity Supply Board, upon resumption of activities in connection with these stations, may install smaller numbers of units at some of these stations than originally planned, thus freeing some of the generating units and related equipment for installation elsewhere. However, these plans have not been crystallized.

The electrification of towns in Burma by smaller isolated stations. The 400V distribution systems at such of these towns as later come under the 11KV and 33KV distribution and transmission networks will be usable in connection therewith at that time.

The transmission and distribution lines to be developed as part of the diesel electric program are discussed briefly below in conjunction with the individual groupings of station types from which the lines will emanate, and further below, under d, is stated general information on these lines.

a. Six 2 and 3 x 1,000 KW Stations. Site clearing has been completed where necessary, non-residential building construction contracts have been let, and work is in progress at several of the sites on foundations for non-residential buildings, and for machines auxiliaries and oil storage tanks. Non-residential building erection is well advanced at two sites. Non-residential building components, main overhead cranes, and gantries have been delivered complete and engine-generator sets with most auxiliaries have been delivered at several of the sites. Transformers, switchgear and steel structures, power boards, control and protective equipment, and forced-draft cooling towers are all scheduled for delivery in the latter part of 1955 and the early part of 1956. Manufacture and delivery of some of this equipment has been held up by delays in approval of foreign exchange. Drilling of wells for cooling water supplies has commenced.

Construction of the 33KV transmission lines for these stations, which is under private contract, is well underway. Considered as a whole, the work on these lines is about 60 per cent complete and will ultimately result in some 450 route miles of 33KV line. The 11KV distribution lines are being built departmentally by the Electricity Supply Board. This work is about 30 per cent completed for the initial stage of development. The 33KV/11KV and 11KV/400V substation equipments will be delivered in late 1955 and early 1956. Construction of the distribution station structures, which will be done from locally obtained materials, is ready to start.

Re-scheduling of the diesel electric program in the light of 1955-56 budget allotments has not been accomplished at the time of this writing. The arrangements for purchase of some relatively minor items from the cost standpoint, though items which are essential to proper completion and running of the stations, have been unduly delayed by the upset financial situation. However, it is expected that several of the stations having 1000 KW units will go into operation before the middle of 1956, and that all of the 2 and 3 x 1000 KW stations will be completed in 1956, under the assumption that materials being changed over from normal purchase procedures to barter and reparations procurement arrangements are received on time and that funds are made available for continuation of construction work at a satisfactory rate.

b. Fourteen 2 x 500 KW and 2 and 3 x 250 KW Stations. All power station sites have been selected and surveyed, soil samples taken and overall location and arrangement layouts made. Considerable portions of the engine generator equipment and auxiliaries have been delivered to Rangoon. All major equipment specifications have been completed. Cranes are in process of shipment. Powerhouse, workshop, and storage building components, and crane gantries are ready for shipment, but are held up pending final arrangements for payment of foreign exchange. Supply orders for purchase of transformers, switchgear and protective equipment are in the process of being placed, and held up pending clarification of the financial position. Foundation designs, overall designs of powerhouses, internal arrangements, layouts for staff quarters and for a considerable part of the civil engineering works at the stations are under way. Only very minor construction work has been done at any of the plant sites.

Approximately thirty per cent of the work on the first stage of the 11KV lines which will radiate from these stations has been finished. Orders have been placed for 11KV/400V transformers and equipment.

c. Electrification of Towns and Villages. (Outlying Diesel Plants). Electrification of towns in Burma was accelerated by the Electricity Supply Board in 1954. This has been done to supply power to people in outlying places as early as possible, and at the same time to build up loads for the larger power development schemes. When these are completed, the small units at many of the towns can be moved on to other similar localities. Up to September 1955, 171 towns had been electrified under the load development scheme. Approximately 70 more towns had been planned for electrification under this scheme by the end of the 1955-56 financial year, but this number is now uncertain due to the recent curtailment of funds.

The total number of towns and villages which will eventually be supplied from the diesel-electric stations included on Table I is on the order of 750, comprising about 110 towns and 550 villages. Of the 171 towns stated in the preceding paragraph, 76 come under the main diesel schemes on Table I. Studies are now in progress to establish the total number of towns and villages to which it will be feasible to supply power from the 33 KV and 11 KV transmission lines to be completed during the 1955-56 financial year. This depends to a large extent upon funds available and has not been ascertained at the time of this writing.

TABLE I
DIESEL ELECTRIC PROGRAM
(Showing large units only)

tion	Initially planned Capacity - KW	Latest Planned Capacity - KW
i	2 x 1000	2 x 1000
mana	2 x 1000	2 x 500
ktila	3 x 1000	3 x 1000
ne	2 x 1000	2 x 1000
rrawaddy	2 x 1000	2 x 1000
ngoo	2 x 1000	2 x 1000
zada	2 x 500	2 x 500
sein	2 x 500	2 x 500
pin	2 x 250	1 x 250
oon	2 x 250	2 x 250
ale	2 x 100	1 x 50
iklat	2 x 100	1 x 55 (existing)
ve	2 x 500	2 x 500
ou	2 x 250	2 x 250
okku	2 x 500	2 x 250
palet	2 x 50	Future
bo	2 x 250	3 x 250
wa	3 x 100	3 x 250
a	2 x 250	2 x 100
o	2 x 250	2 x 100
kyina	2 x 250	2 x 100
lin	2 x 50	Future
kaling Hkamti	2 x 50	Future
k		Future
aw	2 x 50	1 x 55) 1 x 22) (existing)
hoi E'Hang..		
b	2 x 250	2 x 250
oway	2 x 250	2 x 100
kpyu	2 x 50	1 x 250 (from Akyab)
ee	2 x 50	Future
uba	2 x 50	Future
nein	-	2 x 500
ui	2 x 100	1 x 50
y	-	1 x 100
oria Point..	2 x 50	
on	2 x 500	3 x 100
yun Chaungzone)	2 x 100	2 x 100
dwingyi	2 x 250	2 x 250
lay	-	2 x 1000
	New addition	1 x 250 (From Maubin)

:

1. The 3 x 1000 and 2 x 1000 KW stations have been planned to provide for future addition of 1 x 1000 KW unit. Each of these stations is to include a 1 x 25 KW emergency unit. These stations eventually will be connected to the hydroelectric system.
2. The 2 x 500 KW stations have been planned to provide for future addition of 1 x 500 KW unit. Each of these stations is to include a 1 x 25 KW emergency unit.
3. The 2 x 250 and 3 x 250 KW stations have been planned to provide for future addition of 1 x 250 KW unit.
4. Some 500 KW and 250 KW stations will eventually be tied to the Hydro system.

d. 33 KV Transmission and 11 KV Distribution Lines. All of the 33 KV transmission lines being constructed under the diesel-electric program are planned to tie into the high-voltage hydro electric transmission system as it is developed and extended in the future. In the early stages of development of the hydro system one-half to two-thirds of the 33 KV lines now under construction will be interconnected with the main hydro system. From this it is seen that those 11 KV lines which in turn distribute the power fed from the 33 KV lines will be, in effect, tied in with the hydro system. The remaining 11 KV lines, which will distribute from the diesel-electric stations having 250 and 500 KW units, will be interconnected with the hydro system in the future in cases where it is feasible geographically to do so. The rate at which it will be profitable to extend the main hydro system, or smaller hydro systems which may be developed later, to encompass these scattered 11 KV distribution districts, will in each case depend largely upon the rapidity of load growth in the area involved, and should be based upon economic analyses made at the time. In cases where the diesel-electric sets are not required to be retained as standby in order to secure a high degree of performance reliability after the hydro supply has been brought in, these diesel sets may then be moved to other localities as needed.

As the initial capital investment to be made appeared very high when viewed in the perspective of the prospective loads for some years into the future, provision for future double-circuit lines, which would have required a still higher initial investment, was not considered proper and was not made.

For 33 KV lines, steel lattice-work structures with concrete footings and relatively long spans were adopted. The 11 KV lines are being strung on reinforced concrete poles, and 400 V lines on tubular steel poles.

Insulation levels were set corresponding to design voltage levels in all cases.

2. Main High Voltage Transmission System. As the main high voltage transmission system will furnish power in the future to the 33 KV and 11 KV transmission and distribution systems discussed above from some of the hydro-electric projects to be discussed in following sections, a description of the main transmission system as now planned is included here.

Technical, performance, and economic studies made by the Electricity Supply Board showed that 230 KV instead of 132 KV should be adopted for the nominal primary voltage level for the backbone of the main transmission system of Burma, principally because of the long distances involved. Some of the main lines will be 132 KV, and some 66 KV future extensions appear likely. The high voltage lines planned for construction so far are to be single circuit as they will have sufficient capacity to carry the anticipated loads well into the future. Also because of the probable desirability of alternative routing of future circuits, the single circuit lines were adopted in preference to future double circuits with single circuits initially strung. The lines will be constructed in each case in accordance with the design voltage levels.

Scheduled for construction first is one 230 KV line extending from Balu Chaung Power Station No.2 to Toungoo to Rangoon primary substation, which the Electricity Supply Board has planned for location near 15th mile, Prome Road. The next line scheduled within the initial stage of development is the Balu Chaung - Kalaw - Meiktila line, to be constructed at 132 KV. Both of these lines are to be operated at 132 KV until such time as additional generating capacity is added at Balu Chaung and load conditions on the Rangoon line warrant its operation at 230 KV. Both lines will be built with steel cored aluminium cables, and steel towers with concrete and steel grillage footings.

The primary transmission system for Burma is being planned by the Electricity Supply Board to interconnect the major load centers and principal potential power supply points well into the future, with the view

of avoiding obsolescence of the initial developments as the system is extended to meet future requirements. It is expected that the grid will eventually cover an area extending roughly from Shwebo in the north to Pyapon and Moulmein in the south, and from Loikaw and Taunggyi in the east to Chauk and Minbu in the west. Generally, as the load development picture looks at present, areas remote from the above general coverage will probably be supplied by more localized developments. It is likely that future studies will show that it will be more economic to feed smaller remote districts from relatively small hydro developments by means of 33 KV or 66 KV transmission lines not interconnected with the main system.

Surveys of the Loikaw-Toungoo-Rangoon 230 KV line route have been completed, specifications have been prepared, and tenders will be invited as soon as Foreign Exchange Control sanction is secured. Surveys of the 132 KV Loikaw-Kalaw-Meiktila line are in progress.

Primary substation sites have been selected and surveyed for Rangoon, Toungoo and Meiktila substations. Specifications for Rangoon primary substation have been completed and those for the Toungoo and Meiktila substations are well under way.

This basic backbone transmission system constituting the original lines referred to above can be expanded roughly within the general area outlined in the third paragraph above. This expansion can be expected to follow usually along main highways and railroads and to interconnect localities at which sufficient loads develop with the basic system and with sources of power supply selected for future development. The Electricity Supply Board expects to make continuing power system development studies in connection with planning its future development schemes. The conformation of the main transmission system and the order in which various extensions and interconnections should and will be made will depend primarily upon the locations, magnitude and timing of load developments.

3. Pegu Hydroelectric System. Since it has been decided to implement the revised Balu Chaung Hydroelectric Project first, construction of the Pegu Hydroelectric System has been delayed until such time as there is a need for the additional capacity. To fit in with the revised plans for Burma's power net work the design of this plant envisages one which after ultimate installation of capacity will be used for peaking. Field investigations and surveys of the site have been completed but the reservoir survey could not be undertaken because of insurgency in the area. A design report is in the process of preparation by the New York Office of T.A.M.S. and will be submitted early in 1956.

4. Myingyan Steam Plant. This power development was intended primarily to serve industrial plants originally proposed near Myingyan, and the existing market at Mandalay. It would also serve Meiktila, Yamethin and and smaller communities along the route of the proposed transmission line. The principal power loads as originally anticipated up to 1962 are summarized below:

No.	Description	Demand in Kilowatts 1951	 1958	 1962
1.	Domestic	618	5,745	9,589
2.	Ice Plants	-	350	420
3.	Burma Railways	590	850	1,200
4.	Zinc Reduction	-	7,000	11,700
5.	Sulphuric Acid	-	1,000	1,500
6.	Other Manufactures (Fertilizers)	-	1,500	2,500
7.	Port Mechanization	-	300	500
8.	Yamethin Pumps	-	600	1,320
9.	Sinthe Pumps	-	800	1,570
	Total	1,208	18,145	30,299

At the present time, no decision has been reached on the establishment of the zinc reduction, sulphuric acid and fertilizer plants in the Myingyan area, as recommended in the KTAM Comprehensive Report. As indicated in the above table, these plants comprise over 50% of the anticipated load. If it is decided not to develop these plants at these locations, construction of the Myingyan Steam Plant probably will be delayed indefinitely as the remaining anticipated loads can be handled by the diesel system and the new Balu Chaung hydroelectric plant. Overall power coordination studies may indicate the need for a steam plant in this area to act as standby and to firm up the hydro supply after the loads have grown to the point where the hydro capacity is more fully utilized.

5. Saingdin Falls Hydroelectric System. The construction of this project has been deferred indefinitely since the principal consumer of electric energy generated by this plant, a proposed pulp and paper mill, now plans to obtain its power from an oil-fired thermal plant built with the mill. Except for the Jute, Twine and Bag Mill which is being built in Rangoon, other industries recommended in the Comprehensive Report for establishment in the Akyab area because of the availability of low cost power from the Saingdin Falls Project have not as yet been approved. A substantial industrial load is required to justify the construction of this plant.

Field surveys and foundation and materials investigations have been completed to provide basic data for the design of the dam and powerhouse. At the present time, designs, construction drawings and specifications for the project are being prepared in the New York office of KTMS. Designs of the transmission line and switchyard have been deferred because they depend on specific knowledge of the load center locations and the load characteristics.

6. Kalewa steam Plant. M.R.D.C. has retained the services of a firm of consultants to design the Kalewa Coal Development. The consultants will also determine the total power requirements for the coal operation. At the present time it is believed that a 3,000 KW steam plant, utilizing Kalewa coal, will be adequate. Design and installation of the steam plant will be expedited. When completed, this plant can provide limited service to closely adjacent communities. It may be enlarged later to expand this service. A 100 KW diesel plant is now being installed to handle the present load, and for future use as a standby.

7. Paunglaung Hydroelectric Plant. Originally recommended for completion in 1960, this project is indefinitely delayed because the Balu Chaung Project will, when completed, furnish sufficient power for the area tributary to this project for some time in the future. Surveys have stopped and no work is being done.

8. Balu Chaung Hydroelectric Plant. As recently revised, and differing considerably in character and size from the power project recommended by K.T.A.M., the Balu Chaung Hydroelectric project will comprise three power plants located on the Balu Chaung near Loikaw. Power Station No. 2, the one now under development, is being located at Lawpita Falls. The initial capacity of this plant will be 84,000 KW consisting of three 28,000 KW generators each driven by an impulse water turbine at a net effective head of 1390 feet. Annual firm energy production from this plant is estimated to be 370,000,000 KWH initially; the total energy in an average water year 580,000,000 KWH initially. The potential installed capacities and annual energy estimated to be available at the other two sites are: Station No. 1 :- 13,500 KW and 100,000,000 KWH; Station No. 2 :- 30,000 KW and 220,000,000 KWH. The energy production figures in each case are based on an average water year. It is stated by Nippon Koei

Kabushiki Kaisha, the consulting engineers responsible for the design, plans and supervision of construction of the Balu Chaung project, that the capacity and energy production at each of the three plants can be increased to one and one-half to two times the figures stated above by the future development of a potential storage reservoir site about 14 miles upstream from Loikaw.

Detailed investigations have been completed and designs prepared for the initial stage of Station No. 2. More than 50% of the construction machinery is at the site and in operation. Purchase of the balance has been approved by the Electricity Supply Board and is awaiting formal sanction of foreign exchange by the Economic and Social Board. Award of the orders for the generating sets has been approved by Government. Tenders for the low pressure pipe line and penstock have been received and evaluated by the Electricity Supply Board and put up for approval of the Government. The access road to the Lawpita town site and most of the temporary quarters are complete. The roads to the surge tank site and powerhouse site are nearing completion. Thirty per cent of the work of construction of the Loikaw-Toungoo road, which is to be used for erection of transmission line, has been completed. The first unit of the plant for construction power is completed and the three additional 500 KW units are being installed. The excavation of the powerhouse site is well underway. The temporary ropeway along the penstock is nearing completion and excavation along the penstock has commenced. Other items of work, including pondage, diversion weir, and headrace will begin at an early date.

9. Lampha Chaung Hydroelectric Plant. Field investigations have not been initiated due to insurgent activity. Studies have been made by Nippon Koei Kabushiki Kaisha from maps prepared from Aerial Survey photographs supplied by the Electricity Supply Board. From the results of these studies the Electricity Supply Board has concluded that the related developments would

involve large initial capital expenditures to develop the high magnitude of storage capacity probably involved. Therefore, further study of this project is being deferred until alternate means of power supply to the area can be investigated.

10. Mu River Hydroelectric Plant. This is a part of the Mu River irrigation project and will produce low cost power for pumping from the Chindwin and Irrawaddy Rivers south as far as Seikpyu. A budget of K 150 lakhs was requested by A.R.D.C. for Fiscal Year 1955-56 to cover the Mu Valley survey and construction work for the Kyetmauktaung and Zidaw projects.

11. Bawgata-Yunzalin Hydroelectric Projects. Surveys for the Bawgata hydroelectric project were commenced by the Hydroelectric Survey Board during the 1948-49 dry season and were interrupted by the Karen insurrection. Present security conditions preclude continuation of the surveys at this time.

12. Expansion of the Wetwun Hydroelectric Plant. A preliminary report was prepared by E.S.B. in December 1954 indicating estimated increases in demand, possibilities for expansion of the plant to meet the demand, and project estimates for the related work. This report is at present shelved by the Electricity Supply Board. At such time as work on this project is activated, the Electricity Supply Board can prepare construction plans for its relatively small features and implementation can be performed departmentally.

13. Hydroelectric Possibilities on the Zawgyi River. A preliminary report, prepared through the joint efforts of "Geoistrazivanja" and "Elektroprojekt" both of Zagreb, Yugoslavia, was presented to E.S.B. in January 1955. The purpose of the report was to analyze the possibility of the development of the entire Zawgyi River for hydroelectric purposes, and to accomplish the more detailed analysis of the section downstream from

Lawksawk, where the most favorable location from the view point of economic development will be selected. A more comprehensive report on the Lawksawk area hydro power development possibilities is now in the process of preparation by the same firms and will be presented in the near future.

14. Teng Falls Hydroelectric Scheme. At the request of the Minister of Industry, a preliminary investigation of the Nam Teng River at Teng Falls was initiated in May 1954 by ESB. As a result of the investigation, the following conclusions were derived.

a. The Nam Teng is suitable for power development in the seven-mile stretch between Hokun village and the main Teng Falls. The development could be carried out in two stages, the first one utilizing the 150' drop near the Hokun village and the second using the 450' drop near the Teng Falls.

b. (1) The power possibilities at the first site, designing it as a run of the river project, will be of the order of 10,000 KW. When storage on the Nam Teng is constructed, capacity of about 54,000 KW based on the estimated regulated flow of 5,400 cusecs, will be possible during an average year.

(2) The power potential at the second site will be 30,000 KW at the initial stage and may go up to 162,000 KW when the river is fully controlled.

(3) It is possible that another site may be available in the course of the river, particularly near the reservoir sites, if additional power is required to supplement the above.

(4) The combined power potential envisaged at present, by developing the river as "Run of the River Project" is of the order of 40,000 KW and ultimate potential at the two sites investigated will be 216,000 KW providing an annual generation of 1890 million KWH at 100 percent load factor.

c. The estimated cost of generation is comparatively low and energy supplied would be economical for electro-chemical and other industries requiring cheap power.

d. A detailed investigation of the various alternative proposals for development of the ultimate generating capacity of the river basin storage site including comprehensive studies of the geological conditions and an underground power station will be required prior to the preparation of construction plans and specifications.

e. The work can be completed in two working seasons. The cost of the work may be estimated at K 5,00,000 including preparation of construction drawings.

f. A market for the power must be developed before the project studies are carried further.

15. Hydroelectric Power Possibilities in the Chin Hills. At the request of the ESB and the Chin Ministry, "Energoprojekt", Beograd, Yugoslavia, undertook a preliminary investigation of the hydroelectric power possibilities in the Chin Hills. Sites were investigated for the erection of small hydroelectric power plants to supply the towns of Tiddim and Haka in the Northern Chin Hills and Mindat and surrounding villages in the Southern Chin Hills.

a. Haka area. A site on the Tawng Wa, tributary of the Manipur, is recommended for exploitation. The characteristics of the site are such that an installed capacity of 500 KW is possible, however, initial power requirements for the Haka area are only 100 KW and therefore this is recommended as the size of the unit for the first stage installation. When the load increases, the capacity of the plant could be increased by installing two more units of 200 KW each. Costs per KWH are high (11 pyas/KWH) but still cheaper than comparable diesel power. The transport of diesel fuel into the area is expensive and the construction of a small hydro plant to meet local requirements appears to be economically feasible.

b. Tiddim area. Sites on the Beltang Lui, a tributary of the Manipur River, and on the Za Lui near Tiddim, were investigated for suitable power plant sites. A site on the Za Lui, about 2.5 miles from Tiddim was finally selected. Costs per KWH are high (10.6 pyas/KWH) but still cheaper than comparable diesel power.

c. Mindat-Kyauktu area. Development of a 150-KW power plant on the Che Chaung, downstream from the confluence of the MKai Laung, is recommended.

Costs would run 9.3 pyas/KWH, which is cheaper than comparable diesel power. The plant could be increased gradually from 150 KW to 650 KW as the demand increases.

d. Falam area. Some field reconnaissance work was done on the Pao Wa and a tentative site selected; however, as the site is 16 miles from Falam, transmission line costs would be high. It is recommended that further investigations of other sites on small creeks nearer Falam be made to ascertain possibilities up to 150 KW.

16. Hydroelectric Development Possibilities in the Myitkyina and Bhamo Districts. "Elektroprojekt", Zagreb, Yugoslavia, in collaboration with "Geoistrazivanja", Zagreb, were retained by the Government to find sources of cheap hydroelectric power for Myitkyina and Bhamo. Power sites were inspected at the confluence of these streams, about 30 miles upstream from Myitkyina, on the Hpungin Hka, the Namyin Hka, and the Nam Tabet in the vicinity of Myitkyina, on the Chiri Hka, Namphak Hka and Namsang Hka in the vicinity of Bhamo. Conclusions reached, as a result of the study of the power sites, are listed below:

a. The Confluence. At the confluence, conditions are favorable for the erection of a hydroelectric power plant which will be valuable, both as a source of hydro energy and for flood regulation of the Irrawaddy. The project would be much too large for power demands in the foreseeable future. It is recommended that preliminary investigation and data collection for future use be initiated as follows:

(1) Hydrological study and organization of the hydro-meteorological service, setting up gauging staffs and making discharge measurements.

(2) Aerial photography of the storage area and damsite.

(3) Geological survey of the site and the storage area.

(4) Survey of the sites of structures.

b. The Namyin Hka. The Namyin Hka is a convenient source of power for Myitkyina due to its proximity to the town. The amount of power required in the first phase of electrification can be found on its course. Two alternative power sites were located, one approximately one mile upstream from the road bridge near Washawng and one about eight miles upstream from the road bridge near Washawng the lower one having a potential of 730 KW, the upper one a potential of 1,170 KW. Energy costs have been estimated as 3.6 and 3.8 pyas/KWH for the lower and upper sites respectively. Both alternatives are of the same value, the smaller plant having the advantage of a shorter transmission line. The following recommendations were made:

(1) Select one of the previously mentioned power sites on the Namyin Hka for the first phase of electrification of the Myitkyina District.

(2) Make more detailed field investigations of both alternatives, including surveys, hydrological investigations and drilling.

(3) Preparation of preliminary project reports for both alternatives with a comparative study of their economy.

(4) Preparation of a comprehensive project report for the alternative which proves more favorable.

c. The Nam Tabet.

(1) Only the reach from the mouth of the Paknoi Hka for some three miles upstream of Kazu village can be considered for power purposes.

(2) The hydro power plants on the sites involved would have too large a capacity for present or near future needs.

(3) As there are no favorable storage sites, the erection of power plants on the river could be considered only after storage plants have been realized at other sites.

(4) For the above reasons, the development of hydroelectric plants on this river cannot be recommended for the present.

d. The Hpungin Hka does not offer favorable sites for the electrification of Myitkyina.

e. The Chiri Hka.

(1) On the lower reach of the Chiri Hka, a small (1100 KW), cheap (1.38 pyas/KWH) hydroelectric power plant can be built. It is located at a distance of only 12 miles from Bhamo.

(2) It is recommended that a more detailed study be made and that this proposed plant be compared with the Namsang Hka site (Umungya Hka).

(3) The previous recommendation for an investigation of the whole of Chiri Hka is reiterated.

f. The Namsang Hka (Umungya Hka).

(1) Analysis indicates that the Namsang Hka can be developed in two stages conforming to the growing power demand of the Bhamo area. The obtained energy would be cheap (0.91 pyas/KWH).

(2) At relatively small cost, the second stage would result in a very advantageous plant yielding a large quantity of energy which can be utilized flexibly according to the demands of the area supplied. It could be interconnected in a system with other hydro power plants having only daily pondage, which output could then be utilized more efficiently.

(3) The hydrology of the creek should be studied carefully. The catchment area is small and if the low water discharge has been estimated too high, the first stage could not be considered and another solution for the first supply of power to Bhamo would have to be sought.

(4) It is recommended that a project report be initiated for the first stage plant.

17. Hpaungdaw Hydroelectric Plant. Security conditions preclude further investigations for the expansion at this time of this plant. If mining activity increases in the area, the load demand will increase and it will be necessary to secure the area and proceed with the studies.

18. Mogok Hydroelectric Plant. This is a private enterprise and would have to be nationalized prior to a Government study for expansion.

19. Expansion of the Mansam and Konnyaung Falls Plants. The Mansam Falls Plant has been nationalized and is in operation, however, there has been no demand for extra power. The Konnyaung Falls Plant was damaged by the war. There has been very little demand for power on the Lashio side of the river, and the plant is too far from Lashio.

20. Pyaungsho Hydroelectric Project. At the request of the Government, "The British Group" submitted a preliminary assessment of the possibilities of developing power at Pyaungsho rapids. Sir Alexander Gibbs and Partners prepared the report, which was submitted in November 1954. As a result of a reconnaissance survey, the following recommendations were derived:

"(a) Geological conditions present abnormal hazards during the construction and maintenance of any type of power development at Pyaungsho.

(b) The potentialities of the area generally have not yet been explored and there may be other and more suitable sites on the Nam Tu and its tributaries for power development.

(c) It is not, therefore, considered advisable to proceed with further detailed investigations at Pyaungsho at the present time, at least until it has been definitely established that there is no better site in the Mandalay area.

(d) A river gauging station should be installed on the lower reaches of the Nam Tu without delay so that data on river discharge can be assembled for future use.

(e) Additional rain gauges should be established within the catchment area to supplement the scanty data at present available.

(f) The tributaries of the Nam Tu should be examined with a view to the development of comparatively small power projects similar to that already in existence at Wetwun. By this means immediate demands could be met and an electrical load built up which would pave the way for larger developments in the future.

(g) A comprehensive reconnaissance of the Nam Tu should be undertaken to establish geological and topographical conditions in other reaches of the main river which are so far unknown.

(h) A general reconnaissance of the country around Mandalay should also be made to explore the possibilities of power development outside the limits of the Plateau Limestone."

21. Rangoon Electric Supply Board System. The RESB has continued improvements in and additions to its power supply and distribution system in the Greater Rangoon area.

The present installed capacity of RESB is as follows for a present coincident peak demand of under 20,000 KW:-

Ahlone Steam Plant:		
Two - 2,500 KW turbo-generators	-	5,000 KW
Two -10,000 KW turbo-generators	-	20,000 KW
Present installed capacity	-	25,000 KW

To meet a load which, as estimated by RESB, will be of the order of 40,000 KW coincident peak demand by 1958, the R.E.S.B. plans the following additional plant capacity in the years indicated:-

Ahlone Diesel Plant (Fall, 1955):		
Five - 1,000 KW diesel-electric sets	-	5,000 KW
Ywama Steam Plant (1956-57):		
Two - 10,000 KW turbo-generators	-	20,000 KW
Ahlone Steam Plant (mid 1958):		
One - 10,000 KW turbo-generator	-	10,000 KW
Newly installed capacity by 1958	-	35,000 KW
RESB Total installed capacity by 1958	-	60,000 KW

The RESB has stated that the above-scheduled installations are required on the load and for standby in case of outages in its plants at either Ahlone or Ywama, or of interruption of service over the high-voltage transmission line which is scheduled to bring an initial capacity of 40,000 KW from Balu Chaung hydro plant to the Rangoon area by 1958.

Although the foregoing supply for the Rangoon area, including the scheduled 40,000 KW hydro feed, would ordinarily constitute some over-supply considering the amount of anticipated load, the RESB has stated that it is not inclined to rely on the reliability of the hydro supply from Balu Chaung, particularly in view of the possibilities of sabotage along the line. The role of the hydro, under this arrangement, will be to supply energy to the Rangoon area for as much of the time that the long line can be kept in service as is possible, thus saving part of the fuel that would otherwise be consumed by steam-electric generation. The steam pressure would be kept up in the boilers, and some turbo-generators would be kept spinning at no load, so that the portion of the load which would otherwise be dropped could be quickly picked up in case of outage of the hydro line. In the future, when an additional hydro transmission line is justified economically, and when the insurrection has been cleared up, the hydro power supply would be considered firm so that duplicating steam supply will not be needed. Under these conditions the load would have increased to the extent that both the steam and the hydro would be needed, but they would be operated together in a different and more economic manner.

22. Hydroelectric Power Possibilities on the Shweli River. At the request of E.S.B., "Elektroprojekt", Zagreb, Yugoslavia, in collaboration with "Geoistrazivanja", Zagreb, made a preliminary analysis of the water power possibilities of the Shweli River. From the analysis, the following conclusions were made:

(a) The potential hydroelectrical power available at sites on the Shweli and its tributaries is so big that Burma would not be able to make use of it within a reasonable period of time.

(b) The hydropower of the Shweli at the big drop downstream of Namhkam being extremely favorable, it can be expected that it will be of international character and that the big output could be placed on an

international scale by export of power to neighboring countries. It is a question of economic and political significance which should only be pointed out in this report.

(c) The Shweli in the future can play a significant role both as a large source of hydro power and in connection with other means of water utilization.

(d) The reservoir formed by a dam on the Shweli near Namhkam would flood large areas of rural land but would furnish enormous quantities of water which could play an important role in the irrigation and reclamation of the important areas downstream of Namhkam, up to the Irrawaddy plains. It would influence flow conditions of the Irrawaddy by regulating the flood waves and increasing the low water discharge. Storage on the main tributaries would improve flow conditions of the Irrawaddy.

(e) As the development of the Shweli River may greatly influence other hydro schemes and as a consequence the economic life of Burma, it should be specially noted that its more comprehensive investigation is of great importance.

(f) It is recommended that a program of preliminary investigations and studies be initiated, based on a detailed inspection of the stream and, if possible, on aerial photography. This program should include:

(1) An aerial survey of at least the main part of the river

(2) Hydrology. Plan for water gauging and discharge measurement stations, their location and type, determination of the system of gauging, and development of data. The plan should include the rain gauging stations in an analogous way.

(3) Field investigations including detailed field surveying of restricted areas, geological surveys of the region involved, and core drilling on the locations of the main structures (dams, tunnels, etc.)

(4) A preliminary study of the basic elements of the scheme. Considering the large size of some structures, it is suggested to prepare basic solutions and to study them in the light of present technical possibilites (e.g. pressure tunnels, dams, electrical-mechanical equipment, etc.).

23. Establishment of a Hydrological and Water Resources Board. A draft of notification creating a "Hydrological and Water Resources Board", under the Ministry of National Planning and Religious Affairs, has been prepared and approved in principle, but creation of the Board has been deferred for lack of funds. Initial steps in the collection and analysis of hydrologic data have been taken by T.A.M.S. in connection with studies of the Saingdin Falls, Pegu, Kandaw and Irrawaddy Basin projects.

24. Long Range Planning. Some of the projects already mentioned and others not thus far discussed together comprise an enormous power potential well beyond the range of five-to-ten-year programs. The necessity for obtaining hydrologic data over a long period of years and of providing for the eventual orderly development of these resources requires that long range planning be continued until the ultimate utilization has been formulated in at least preliminary outline. A start has been made in this long range planning in the study of the Irrawaddy Basin development being prepared by T.A.M.S. A systematic schedule for the conduct of other investigations is still to be desired.

25. Expenditures. The Electricity Supply Board expenditures for financial year 1954-55 and several preceding years are shown in Table II.

Financial Year	Capital Expenditure Excluding Stores. K	Stores Expenditure K	Revenue Expenditure K	Total Expenditure K
1950 - 51	36,25,000	4,47,000	16,20,000	56,92,000
1951 - 52	49,67,000	17,45,000	23,73,000	90,85,000
1952 - 53	60,39,000	26,34,000	36,54,000	1,23,27,000
1953 - 54 *	2,61,30,000	1,46,73,000	51,34,000	4,59,37,000 *
1954 - 55 *	5,05,94,000	3,20,84,000	1,39,61,000	9,66,39,000 *

* Figures for FY 1953 - 54 and FY 1954 - 55 are provisional.

C. CONCLUSIONS AND RECOMMENDATIONS:

1. Without reiterating all of the conclusions and recommendations contained in this supplement in detail, certain significant observations are presented in the following paragraphs.

2. Progress is being made in the accomplishment of parts a. and c. of the dieselization program (see paragraph B 1.), but part b. of the program, covering the 500 KW and 250 KW stations, has fallen behind schedule and is now being delayed in view of the stringent financial situation.

3. Although many hydroelectric sites were investigated, and plans initiated for three, actual construction is limited to the Balu Chaung Hydroelectric Project. At the present time it appears that the Balu Chaung development, assuming that transmission lines can be protected from sabotage, will meet the requirements of the more developed sections of the Union from Rangoon to Mandalay for a considerable time into the future.

4. The Myingyan Steam Plant will not be considered until industrial and other loads develop in the area.

5. Prior to the initiation of work on more power plants, it is recommended that the following actions be taken:

a. Comprehensive power market studies of the various areas be made to determine the existing and potential electric energy requirements (industrial, agricultural, commercial, domestic, etc.) and the sizes and types of additional power developments be based upon the results of these studies. These studies should be under the auspices of and controlled by the Electricity Supply Board, but close cooperation will be required with the Industrial Development Corporation and the Minerals Resources Development Corporation so that their plans may be known and power supplies be made available to meet their needs.

b. Development of small hydro plants to furnish electric power to some of the isolated sections of the country which are too far from the main hydro system for economic power transmission and to which the transport of diesel fuel is difficult and expensive should be seriously considered as soon as foreign exchange becomes available.

c. Collection should be started as soon as possible of data necessary for the development of water resources, such as continuous observations of the stream flow at properly selected locations, the expansion of the system of rainfall gauges to include more of the tributary watersheds for which no information is now available, the initiation of control surveys and expansion of aerial photography to areas not now covered, for the small as well as the large projects.

d. Construction needs and priorities of future power supply projects should be determined on the basis of market studies and the comparative merits of the individual projects when considered among the whole including consideration of transmission feasibility. To accomplish this, overall power system planning studies should be carried out by the Electricity Supply Board to co-ordinate roads and power supply resources into the foreseeable future.

It is a basic fact throughout the world since the advent of electricity developed for practical use that the economic well-being of countries or parts of countries and the resultant living standards of their peoples are closely related to the extent of their development of electric power. However, overdevelopment of power facilities, with attendant unwarranted financial burdens, or their underdevelopment, with resultant retardation of progress, are both to be avoided where possible. Accordingly, the chief recommendation to be made here, in summary of paragraphs 5 (a) to (d) inclusive above, is for early implementation of overall power resources

and development studies made in the light of present developments and matched against the indicated power market requirements. These studies should be based on realistic load surveys, and on the coordinated use of diesel, steam, and hydro facilities through proper transmission interconnections so as to arrive at a sound, business-like plan of power development for the Union. Concentration should be on projects which fall within the realm of possible development within the next fifteen to twenty years. Organizational planning should be such as to enable indefinite continuance of such studies, with fairly complete revision every two or three years in the light of the latest physical data, load developments, and other controlling circumstances.

6. It is further recommended:-

a. That the Hydrologic and Water Resources Board be activated at the earliest practicable date.

b. That re-organization plans now under way be expedited to regroup the organization of the Electricity Supply Board along lines better reflecting the engineering and operating nature of its functions.

c. That the electric rate structure be thoroughly reviewed and reconstituted to reflect all of the costs, as well as the objectives of the development programme.

IBRD

GOVERNMENT OF THE UNION OF BURMA

Burma.

MINISTRY OF NATIONAL PLANNING AND RELIGIOUS AFFAIRS

COMPREHENSIVE DEVELOPMENT PLAN

Supplement, September 30, 1955

INTERNATIONAL [illegible] FUND

[pt. 5]

MINERAL INDUSTRIES

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No. Ah Nya 826/00/55
Government of the Union of Burma
Ministry of National Planning &
Religious Affairs
No. 44 Kandawgalay House, Rangoon

Dated the 21 November 1955

Subject: Comprehensive Development Plan --
Transmittal of Supplement, "Mineral Industries"

Broad systematic planning for the development of the resources of the Union of Burma received its first major impetus with the presentation of the Pyidawtha Programme at the Union Conference in August 1952. This Programme was enlarged and strengthened by the completion in August 1953 of the more detailed "Comprehensive Report on the Economic and Engineering Development of Burma"*.

It is the present programme of this Ministry to enlarge and amend the Comprehensive Plan as rapidly as additional planning information and studies will permit. The accompanying supplement, entitled "Mineral Industries", is therefore to be regarded as the current revision of this subject, amending and supplementing Chapter 21 of the Comprehensive Report of 1953 in the Government's Comprehensive Development Plan.

The official Comprehensive Development Plan of the Government may be considered to comprise at present the following reports:

1. Preliminary Report on Economic and Engineering Survey of Burma	January 1952
2. The Pyidawtha Conference (Resolutions and Speeches)	August 1952
3. Comprehensive Report on Economic and Engineering Development of Burma	August 1953
4. Summary of Proceedings -- Conference on Programme of Development and Reconstruction	Februaty 1954
5. Supplements:	
a. Electric Power	SEPTEMBER ~~October~~ 1955
b. Mineral Industries	September 1955
(Others in preparation)	

John McGrath
(Mo Myit)
Secretary
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& Religious Affairs

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* Prepared under the auspices of the Ministry of National Planning with funds provided by the Technical Co-operation Administration (U.S.) by Knappen-Tippetts-Abbett-McCarthy, Engineers in association with Pierce Management Inc. and Robert R. Nathan Associates, Inc.

Government of the Union of Burma

Ministry of National Planning and Religious Affairs

Comprehensive Development Plan

Supplement, September 30, 1955

MINERAL INDUSTRIES

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GOVERNMENT OF THE UNION OF BURMA

MINISTRY OF NATIONAL PLANNING AND RELIGIOUS AFFAIRS

COMPREHENSIVE DEVELOPMENT PLAN

Supplement, September 30, 1955

MINERAL INDUSTRIES

A. DEPARTMENTAL AND COMPREHENSIVE REPORT RECOMMENDATIONS AND ACTION TAKEN BY "CONFERENCES ON PROGRAM OF DEVELOPMENT AND RECONSTRUCTION, 15-22 FEBRUARY 1954"

1. Departmental and KTAM Comprehensive Report recommendations, with action or comment on them at the conferences, are listed below. Those recommendations listed without comment were accepted.

a. Reorganize and augment the Mines Department.

b. Complete the staff and expand the activities of MRDC.

c. Expedite the mineral resources survey program.

d. Expedite regional mineral resources surveys.

e. Reconstitute and expand the Burma Geological Department.

f. Prosecute full development of petroleum resources.

g. Prosecute Kalewa coal development.

h. Construct the Myingyan industrial center. This is contingent on Kalewa coal and on the development of the zinc market.

(1) Myingyan zinc plant.

(2) Exploit the zinc market potentialities of India.

(3) Determine the potential expansion of the Bawdwin production rate.

(4) Negotiate purchases of Bawdwin concentrates.

(5) Negotiate for the use of electrothermic processes.

(6) Stock coal samples for reduction tests.

(7) Complete zinc plant site studies.

(8) Explore the Lough Keng deposits.

i. Develop the Lough Keng deposits.

j. Continue the development of antimony resources. This has been deferred, subject to developments in the antimony market.

(1) Explore the Mong Sang deposit.

(2) Explore the Tenasserim prospects.

(3) Provide instructions to antimony producers.

k. Institute a general revision of the mining laws.

l. Initiate a program for restoration of prewar production of minerals.

m. Devise systematic procedure for modernizing mining methods.

n. Devise a general program of access road construction. This program is for execution by the Ministry of Public Works.

o. Prepare a general technical eduction and training program.

B. ACTION TAKEN BY IMPLEMENTING AGENCIES

1. The Ministry of Mines, where the responsibility for mineral resources lies, at present consists of the Mineral Resources Development Corporation, the Mines and Explosives Department, and the Burma Geological Department. Steps are being taken to reorganize and augment these agencies, as indicated below:

2. The Mineral Resources Development Corporation is a relatively new agency of the Government and has not yet attained its full growth. The Secretary of the Ministry of Mines is the Director-General, or the executive head of the Corporation. It was considered desirable by the Ministry and the Board of Directors that the two posts should be held

by the same person to facilitate liaison between the Ministry and the Corporation as well as between the Corporation and other agencies of the Government. Officers of the Burma Geological Department and of the Mines Department have been placed in charge of some of the projects undertaken by the Corporation. The Corporation has nine branches, viz: general liaison, accounts, marketing, procurement, civil and mechanical engineering, consulting engineers and geologists, drilling, training and miscellaneous projects. Among the miscellaneous projects are the Namyen mine, Kalewa coal mine, Taunggyi iron mine, Tavoy iron mine, Sinbo copper mine, Lough Keng mine, and the Regional Chemical Laboratory at Taunggyi.

The staff now numbers 485 persons. Continual steps have been taken to expand the staff of the Corporation, not only with Burmans but with trained foreign technicians, preparatory to launching an extensive program of operations in the mining industry. Attempts were made to recruit a mining engineer with general experience, a mining engineer with colliery experience, an economic geologists, and a metallurgist.

3. The Mines and Explosives Department guards the interests of the Government by exercising control over mines and mining operations in Burma. It sets up regulations to implement the mining code as it relates to safety practice, certification of mine foremen, inspectors, electricians, and other skilled personnel. It aids in the establishment and maintenance of safety, health, housing and welfare provisions for miners and other employees of the industry. It encourages the adoption of modern practices and the efficient development of mineral resources to prevent waste of these national assets. The Mines and Explosives Department is being expanded on the basis of the scheme submitted by Mr. F.W. Binge, former Mining Advisor to the Government. Its organization is as follows:

Proposed Posts	Posts Presently Filled
Director	-
Deputy Director	-
Chief Inspector of Mines & Explosives	Filled (Officer-in-Charge)
Metallurgist	-
Mining Engineers (2)	Inspector (1)
Senior Mining Engineers (10)	-
Junior Mining Engineers (19)	Junior Mining Engineer (1)
Chief Surveyor	-
Chief Assayor	-
Inspector of Mines (4)	-
Junior Statistical, Utilization and Information Officers (3)	Statistician and 2 State Scholars

4. The Burma Geological Department conducts field studies in promising areas for exploration. In February 1954 an extensive program was planned involving exploration for coal, iron, manganese, talc, phosphate, limestone, glass stone, kaolin, fluorspar, gypsum and lead. This was curtailed and limited to coal, iron, copper, gypsum, and lead. The Department is being reconstituted with a staff of 23 post as shown below:

Proposed Posts	Posts Presently Filled
Director	(Acting Director)
Deputy Director	-
Senior Geologists (6)	(Senior Geologist (Officer-in-Charge) (Geologist (1)
Junior Geologists (12)	Junior Geologists (2)
Chemist	Chemist
Assistant Chemist	-
Curator	-

An effort is being made to recruit persons for the other posts both at home and abroad. Nine State Scholars in Geology are at present either studying in or awaiting admission to American and British Universities.

5. The Mineral Produce Marketing Board was established about 1948 with the object of assuring a continuous stable market for small mineral producers, and to protect them from unfair practices by private buyers. Marketing department facilities were set up and marketing officers assigned at Rangoon, Mergui and Tavoy. In 1954 this board was amalgamated with the M.R.D.C., however, with the creation of the Ministry of Trade Development, the marketing section will be transferred to that agency.

6. Rehabilitation, Development and Exploitation of Resources: The M.R.D.C. is undertaking the rehabilitation and expansion of former enterprises exploiting mineral resources. These include the Kalewa coal field, the petroleum industry, Bawdwin lead and zinc mines, the Lough Keng zinc project, the Namyen wolfram mines, and the Mawchi mine. These activities are highly important and will probably be the most productive of any effort made to develop mineral resources, decrease expenditures of foreign exchange, and possibly increase foreign exchange reserves.

Hampering some of the rehabilitation has been the lack of security in regions surrounding the mines. This has been fairly well cleared up and if present conditions are maintained, operations can be accelerated and expanded at Mawchi and in other smaller installations.

Various studies have been made of the economic value to the country of its various minerals. These show that prior to the war tin, tungsten, lead, silver and petroleum were of greatest importance. The principal base metals produced during the fiscal year 1953-54 included lead and lead concentrates, zinc, iron ore, tin, and tungsten. Production of petroleum is still only a small percentage of prewar volume. Coal mining has not yet entered

wholesale production. Copper is produced in small quantities. The accompanying tables show production in various minerals. New fields being explored which show some promise of being valuable to the economy of the country include antimony and manganese, although because of the poor world market the former is not too active. A brief review of what has been done recently in each of these fields follows:

a. Coal. Following a thorough preliminary survey, study and investigation of Burma's solid fuel industry, a report was prepared by KTAM on the development of the Kalewa coal deposits. Seven recommendations were made. What has been accomplished in carrying out each of these is described briefly below:

A drilling exploration program was contracted for with Pierce Management Inc. Of the 17,000 feet of drilling specified, the mining consultants completed about 15,000 feet by July 1954 and have submitted their report which is now being studied by M.R.D.C. Drilling is being continued with personnel of M.R.D.C. trained by Pierce. This exploration has resulted in new seams being discovered which are said to contain a better grade of coal than existed in the old seam.

In 1952 samples of coal were obtained from the main seam known at that time and sent to the United States and Germany for analysis. Local combustion tests on conventional grates in the fire boxes of boilers and locomotives of the Burma Railways and Inland Water Transport indicated the necessity of mixing with Indian coal or briquetting. However, it was found that unprocessed coal from the old seam is suitable for use as a pulverized fuel on a pneumatic spreader stoker. Suitable methods for briquetting were subsequently investigated and reported on. Seven tons of coal from the new seam and about 50 tons from the old seam were sent to Germany during the

past year for continued testing. Samples have been furnished the Industrial Development Corporation for test purposes.

A topographic survey of the coal field area (3/4 mile x 5 miles) has been undertaken by the Survey Department but has not yet been completed. Geologic mapping of all coal exposures has been partially accomplished but a thorough survey has not been possible. The United Nations has furnished a coal mining expert to assist in making this survey.

A manpower study has been made of requirements for full operation of the mine and some arrangements have been made for training of personnel. Fourteen boys, having passed a Preliminary Engineering Course at the Artisan Training Center, have been trained in drilling at Thitchauk under American drillers and are presently carrying on the exploratory drilling at Kalewa. Other training is being given to 60 men in the expansion of the drift mine. To meet the proposed initial mine capacity of 1,000 tons of run-of-mine per day, it has been estimated to require 750 underground workers, 250 surface workers and a number of administrative and supervisory employees.

A preliminary study has been made of methods of transportation of coal. An economic analysis and recommendations were contained in the KTAM Report as to the movement of coal by small shallow draft barges down the Chindwin River to Myingyan where it would be transferred to large Irrawaddy River barges or to rail. A recent study has been made by KTAM of the work to be done to render the Chindwin navigable and a report submitted to the Ministry of National Planning. With information from this report and that gained by the 1954 Purchase Mission a fairly accurate estimate of the cost of water transportation can be obtained.

The market for Kalewa coal depends to some extent on characteristics ascertained by tests now being made and on the development of industry and hydroelectric power in Burma. The following determination has recently been made by prospective consumers of the country's coal requirements:

Name of Consumer	Kind of Coal	Annual Tonnage 1954	Annual Tonnage 1959
1. R.E.S.B.	Slack (fine)coal	45,000	65,000
2. Burma Railways	Lump (screened) coal	130,000	100,000
3. Marine Department	" " "	28,000	28,000
4. P.W.D. (Elect)	" " "	3,000	3,000
5. P.W.D. (Dredger Div)	" " "	2,000	2,000
6. I.W.T.	" " "	11,000	11,000
7. Rangoon Corporation	" " "	11,000	11,000
8. Ministry of Industry	" " "	-	556,000
	GRAND TOTAL:	230,000	776,000

As a result of the above preliminary work, a recommendation was made by the Ministry of Mines and approval obtained very recently from the Economic and Social Board for installation of a colliery at Kalewa to produce 1,000 tons of coal per day. Steps have been taken to implement this project in easy stages.

The main haulage way of the mine is now about 250' in the 9' seam and the main return airway about 265'. The main slope was started in February 1955. About 200' of the inclined shaft down the drift have also been completed. Production is now about 50 tons per day. A 100' haulage way has also been opened on the southern bank of the Myitha river.

b. Petroleum. Prior to the war the petroleum industry was the third largest in Burma. It employed about 20,000 workers,

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producing an average of almost 7 million barrels of crude oil annually. The larger part of this was exported, with about 5 million barrels shipped to India. About 1 million barrels of liquid products were sold in Burma. More than 90% of the crude oil produced came from the Chauk and Yenangyaung oil-fields.

After the war, the three largest oil companies (Burmah Oil having 75%, Indo-Burma Petroleum 12½% and British Burma Petroleum 9½% of the prewar production) combined their holdings and subsequently united with the Government in a joint venture, adopting the name Burmah Oil Company (1954) Ltd., with G.U.B. having a one-third interest. The company now has a topping plant at Chauk with a capacity of 2,000 barrels per day together with a new distillation plant of 2,500 barrels per day. Plans are presently underway to rehabilitate the Syriam refinery to provide an initial capacity of 3,500 barrels per day which will increase the national output to 6,000 barrels.

Implementation of barge transportation from the Chauk oilfield is part of the present development program and tenders have been invited by the I.W.T. for barges and towboats for this purpose. Rehabilitation and operation of the former pipe line was found to be less economical than providing and operating a barge fleet, particularly in view of the vulnerability of the pipe line to sabotage along a great part of the route. Another cogent argument in favor of barge transportation was the possibility of future development of oil fields in the Delta region where it is impractical to use other forms of transportation. This applies as well to other fields not bordering the oil pipeline.

To meet present domestic requirements of Burma, a crude production of 6,000 barrels per day will be required. At this rate

known resources may be depleted in 25 years. New fields must therefore be developed if Burma is to be self-sufficient. Conversely, limitations of known reserves in present fields will restrict the feasible development of refining and transportation facilities unless other pools or fields are discovered. Continuing geophysical and other exploratory work by seismograph and drilling must be performed. The Burma Oil Company (1954) Ltd., is contemplating early prospecting for oil in the Delta region. Steps are being taken to conserve the Yenangyaung oil fields. Every incentive must be offered by the Government to encourage prospecting and subsequent development of the petroleum resources of the country.

c. Zinc. The Bawdwin mine is the only source of the zinc concentrates produced and shipped from Burma. Prior to the war the Namtu mills produced about 66,000 tons of zinc-sulphide concentrates annually. Mine output is presently at the rate of some 8,750 tons of ore per month which is equal to the current mill processing capacity. Employment at Namtu is 3,000 and Bawdwin over 2,000 with 1,700 workers underground. It has been found necessary to import foreign labor such as was formerly used to operate the mines and mill.

2

The Bawdwin ore body is estimated to have a total reserve of 3,500,000 tons with the possibility of an additional 1,000,000 tons in the Meingtha lode. If the reserves can be proved and favorable economic results are indicated, the Burma Corporation (1951) Ltd., may increase the capacity of the concentrating mill. A reported additional reserve exists above ground in the form of some 2,000 tons of slag, (part of it directly underlying the present mill), bearing approximately 20% zinc. Power for the extraction is presently not available. The slag does, however, give promise

of a working reserve for the Namtu mills at some future time, after Bawdwin ores are exhausted. Export of zinc concentrates from Bawdwin is continuing and arrangements have been finalized for the sale of 32,000 to 35,000 tons from Bawdwin in 1956. Detailed investigation of the Indian market has not yet been made. If and when a sulphuric acid plant is built in Burma this will be another outlet for zinc concentrate. 2

The Lough Keng zinc carbonate ore deposit in the Shan States is another, although less important source of zinc. Progress in implementing the project during 1954-55 has been slow because of paucity of technical personnel and lack of proper communications.

The so-called Myingyan Project is conceived as an industrial center comprising a number of industries attracted by the combination of inexpensive fuel and power and convenient rail and water transportation. Most important of the contemplated industries is a zinc smelter and refinery with zinc concentrates supplied by the Burma Corporation and zinc ores by the exploitation of the Lough Keng deposit. Advances have been made to the New Jersey Zinc Corporation with a view towards developing a suitable processing plant. The project has been held in abeyance, however, pending further investigation of the Kalewa coal situation and economic studies reflecting the present low price of zinc.

d. Lead. Bawdwin Mine is Burma's largest producer of lead and ranks as one of the great lead-silver mines of the world. The lead is associated in situ with zinc, copper, silver, cobalt, nickel and antimony. The low grade ore extracted from the mine has been found to contain the following quantities of the various minerals: Lead 8.9%, Zinc 5.3%, Copper 0.12% and Silver 6 ounces per ton.

Cobalt and Nickel are recovered in small quantities from the speiss produced in smeltering the lead. Antimony is also found in very small quantities. During prewar operations, in 1938, shipments of cobalt from this mine placed Burma as the world's fifth largest producer of this strategic mineral.

The present activities and the future plans for the development of the mine and mills by the Burma Corporation (1951) Ltd., have been described in preceding paragraphs relating to the production of zinc.

e. Tin and Tungsten. These minerals are generally discussed under the same heading because in many instances in Burma they occur in the same deposit.

The Mawchi mines in Kayah State are among the most important worldwide producers of tungsten and comparatively important producers of tin. They were recently recovered from the insurgents and plans are being made for their rehabilitation. Prior to the war these mines were responsible for approximately 36% of Burma's total output of tin and tungsten.

The Namyen wolfram mine in the Tenasserim Division is also in partial production. The principal difficulties attendant to operations here have been suitable access roads and water supply. The 33-mile-long road from Daunganu Base Camp to the mines has been completed. For water supply, a dam is being built which should be completed in 1956. A year-round supply of water is assured and an average monthly production of 40 tons of ore concentrate is expected.

The present market for tin and tungsten has not encouraged development but with the stimulus of better prices this section

of Burma's industry could be of great importance as a producer of foreign exchange.

f. Antimony. Antimony has been reported to be one of Burma's valuable minerals and metals susceptible to export. The antimony resources of the country have been developed to only a small degree with about 30 mines reported to have been active before the war. Shipments of ore since then have been insignificant or nil. In a report on proposed antimony smelting, prepared by Dr. C.Y. Wang, Consulting Metallurgical Engineer and submitted to the Government in December 1952, it was recommended that there be a thorough geological examination and sampling of all-important antimony ore deposits and an investigation of the most efficient methods and techniques for exploiting them. These recommendations are concurred in by the Ministry of National Planning with special reference to the development of the Mong Sang deposits. However, the current low price of antimony on the world market has detracted from the desirability of its exploitations. The few geologists available in Burma have been engaged on what are potentially more profitable mineral development. There have been no trained technicians available to instruct private operators in better methods of operation. As a result the M.R.D.C. has chosen to defer all activity in regard to antimony until a rising market gives more incentive to its production.

g. Iron. Iron ore has been found in past years in some 20 deposits in Burma. The only large scale mining of iron has been done by the Burma Corporation, Limited, which obtained about 25,000 tons of ore per year to provide iron ore flux for smelting the ores of lead and zinc derived from the Bawdwin mine.

With the implementation of the new steel rolling mill in Rangoon it will be necessary after a few years, when the present supply of scrap is exhausted, to obtain ore essential to the manufacture of the pig iron used in the production of steel. A new source of ore is being sought in surveys being made by Mr. Helmut Koch of the German firm of Demag Aktiengesellschaft which is furnishing plans, machinery, and equipment for the new rolling mill. Surveys have been carried out in the Tavoy and Mergui Districts where drilling operations are now underway. According to latest estimates, the total tonnage deposits found near Khamaungtaung, Myohaung and elsewhere in the Tavoy District is about 1.5 million. Demag is making extensive analyses of these ores.

A second deposit of iron has been found near Taunggyi which is thought to be better than those at Tavoy. High grade iron ore has been located and known deposits are now estimated at more than 10 million tons, sufficient to supply all of Burma's requirements for iron and steel for a long period of years if economical operations can be devised.

A magnetometer survey has also been made of a portion of Burma by the Aerial Survey Directorate but the results have not been interpreted as yet. The aerial photography program is suspended temporarily but is planned to continue the magnetometer work in the near future.

h. Copper. A number of minor occurrences of copper are known in Burma but none has been productive except the Bawdwin Mine. All copper produced in Burma in past years has come from this mine. It is estimated to contain a reserve of 420,000 tons of copper with the possibility of another 100,000 tons in lodes as yet undeveloped.

Exploration for copper in the Monywa and Kyaukse districts by geologists of the M.R.D.C. has resulted in favorable findings. Yugoslav geologists retained by the M.R.D.C. are presently investigating copper resources in the Sinbo area of the Kachin State. The principal copper exploration and development projects for the next three years will be the Sinbo Project and the Kawlin Project (Katha District).

i. Manganese. Manganese deposits are being explored and worked by private interests in the Popa area. Analysis of a sample from the richer portion of the deposit showed a manganese content of 56%. However, the prospects here for a large ore body are not very encouraging. Better deposits are now being marked in the Hopong area in the Southern Shan States. Examination of other occurrences in the low hills near Yaynay and Sein Kyaung along the Sittang River and on certain islands in the Mergui Archipelago have been recommended. A shortage of geologists has prevented exploration of these areas.

7. Exploration and Development of New Industry: The program for restoration of prewar production of minerals has met with considerable success in as far as activities of the Burma Corporation (1951) Ltd. and the Burmah Oil Company (1954) Ltd. are concerned. As described heretofore private enterprise is also being aided in the development of manganese deposits in the Popa area and copper in Monywa, Sinbo, and Katha. The output of lead and manganese by private interests in the Southern Shan States has shown a fair increase. In other areas, however, such as Tenasserim, lack of security has hampered development.

While surveys for essential minerals are being carried out by the Geological Department and the M.R.D.C., lack of trained geologists has

retarded this essential work. Employment of foreign experts has been a partial remedy. They are being used in exploring for iron ore in the Tavoy and Mergui Districts and copper in the Sinbo area of the Kachin State and Kyaukse. The few geologists attached to the Geological Department have meantime been exploring various deposits in the Chin Hills, Kachin States and Shan States. Recruiting of additional geologists is an obvious need.

A Central Drilling Pool has been established under M.R.D.C., consisting of 2 foreign drillers and Burmese crews. The work of the pool consists of foundation and exploratory drilling, and mineral exploration.

Assistance has been given to small private developers by M.R.D.C. by providing services of assayors, chemical laboratories, and marketing agents. The type and scope of such services is described in more detail elsewhere in this supplement.

8. Revision of Mining Laws: To facilitate development of Burma's mineral resources several changes in present mining laws and regulations, and taxes relating to mines were recommended in the KTAM Comprehensive Report. These included the following:

a. Revoke the principle of hereditary ownership.

b. Permit free travel of prospectors to promote development of mineral resources.

c. Revoke necessity to obtain certificate of appointment before issuing prospecting licence of mining lease.

d. Revoke necessity for prospecting licence and provide 1 year mineral exploration licence.

e. Abolish disc licence and substitute mining exploration licence.

f. Revoke mining lease and substitute mining exploration licence.

g. Promote safeguards for foreign capital investments.

These recommendations were initially concurred in generally by M.R.D.C. The opinion of local officers and associations of mining interests has been asked. Mining laws of other countries have been procured for reference. It is planned to consult with the Financial Commissioner on this matter and specific recommendations are being made to Government. However, M.R.D.C., has now dropped recommendations e, d, and f.

9. Research, Testing, Assaying: In carrying out recommendations of the Comprehensive Report for research, testing and assaying, a Regional Chemical Laboratory has been set up at Taunggyi in the Southern Shan States to serve private needs as well as the needs of the M.R.D.C. in testing minerals of that region. An assay office and ore dressing laboratory has been established at the Union of Burma Applied Research Institute in Rangoon. Preparations are being made for staffing additional assay laboratories in various parts of the country with a call by the M.R.D.C. for science graduates to be trained in the Geological Laboratory in Rangoon.

Considerable research and testing has been done in connection with the processing and utilization of Kalewa coal. Tests on ore dressing and concentration of antimony deposits are also contemplated.

10. Education and Training: Progress in developing mineral resources is restricted to a large degree by the paucity of geologists, mining engineers and skilled workers. To remedy this situation, the Comprehensive Report recommended establishing long term training programs for labor supervisors, technicians, administrators, etc.

Plans have been formulated by the M.R.D.C. for a program for general technical education and training under foreign technicians. Recently recruited from India were the following technical personnel who will promote mineral development and aid in on-the-job training:

Geologists	11
Geophysicists	3
Doctors	5
Engineers	7
Surveys Draftsmen	17
Colliery Mine Managers	2

The Kalewa Drift mine about to be undertaken is intended to be a training mine for local personnel of whom large number will be required when the main mine is opened. Arrangements are also being made under the Colombo Plan to train Burmese youths in mining methods for a short term of one to two years in Colombo Plan countries. Fifteen are receiving training in Australia. At the end of the training period of 18 months they will return to Burma as leading miners in the Kalewa coalfield.

Trainees have been recruited for employment in exploratory drilling for minerals, drilling equipment has been purchased and foreign drillers have been employed as supervisors and instructors.

A Mining Engineering course has been made available at the request of the Ministry of Mines at the University of Rangoon to meet the acute shortage of Mining Engineers.

As stated heretofore, consideration is being given to inviting science graduates to take courses at the University of Rangoon Geological Laboratory to train them as chemists for assay laboratories.

The M.R.D.C. has in view setting up a Union School of Mines in Rangoon for the training of supervisory staff required for mines all over

the country. Activation of a school such as this is of highest importance, and appropriate steps will be taken to formulate the curriculum, determine the organization and staff necessary for its implementation, and prepare for the acquisition of land, construction of buildings, and purchase of equipment as funds become available. To meet immediate needs a course in Mining Technology has been opened in the Government Technical Institute, Insein.

The problem of obtaining trained technicians, experienced administrative personnel and skilled workers is a continuous one, the solution of which is essential to the successful completion of Burma's plan for economic development. Pending establishment of a State school of mines and other educational facilities, training must be obtained abroad under State Scholarships or under an aid plan. Completion of training does not qualify one as an expert and until years of practice furnish experienced personnel another source must be found. As is now the case, foreign labor and foreign technicians will have to be recruited and for the next several years, in slowly decreasing numbers; they will have to be employed in mining and other industrial enterprises in Burma. Consideration is being given to development of a formal schedule for annual participation by the Government in such a program.

11. Finances: The following table shows the expenditures on the development of mineral resources during the past two years and is an index of progress. Obviously, it has not been up to expectations when actual expenditures are compared to budget amounts. Omitting the Namyen wolfram mines, an average of slightly more than 6% of the budgeted amounts for various enterprises was spent during the first quarter of 1954/55 fiscal year.

ANNUAL BUDGET AND ACTUAL EXPENDITURES FOR MINERAL RESOURCES
(Thousands of Kyats)

Item	Project	1953-1954		1954-1955		1955-1956
		Budget	Actual Exp. (Prov.)	Budget	Actual Exp. 1st Qtr.	Budget
1.	Lough Keng Zinc Project	-	174	306	26	496
2.	Copper Ore Projects - Sinbo	-)	2	400	1	370
	- Kawlin	-)				270
3.	Iron Ore Projects - Taunggyi	-)	44	598	38	890
	- Tavoy	-)				760
4.	Namyen Mine	-	1,178	4,518	1,018	6,660
5.	Kalewa Coal Project	-	464	6,000	694	11,238
6.	Reserves - ten projects - copper, iron etc.	-	-	-	-	1,012
7.	Yenangyaung Oil Field Rehabilitation Project	-	-	350	-	910
8.	Regional Chemical Laboratory	-	82	399	32	359
9.	Marketing Office - Rangoon	-	-	45	-	-
	- Tavoy	-	-	430	5	-
	- Mergui	-	-	-	5	-
10.	Mineral Resources Office (Myitkyina)	-	14	-	6	-
11.	Technical Training Program	-	-	300	-	440
12.	Head Office	-	1,291	623	123	1,110
		19,000	3,249	13,969	1,948	24,515

SP-402

18/11/55

CTION PLANNED BY IMPLEMENTING AGENCIES

1. **Lough Keng Zinc Project:** Sufficient number of technical rsonnel can be diverted to this project in fiscal year 1955-56. Develop- nt works will probably be completed before September 1956. Mining tivities are to start about the middle of 1955-56. Total expenditure d revenue figures are estimated to be about K 7 lakhs and K 3 lakhs spectively.

2. **Sinbo and Kawlin Copper Projects:**

a. Surveys of the Sinbo copper mine by geologists from the Yugoslav firm of Messrs. Geoistrazivanja, in cooperation with Burmese geologists, indicated the advisability of developing this project. Capital expenditures are estimated to be about K 4 lakhs for 1955-56, covering survey and exploration, purchase of machinery and equipment, engineering services, and development and construction. As the percentage of pure copper in the ore is very low, the mine is to be sufficiently mechanised so as to keep unit costs to a minimum.

b. Investigation of the Kawlin project by the same Yugoslav experts indicated the desirability of developing this project. Capital investment is estimated to be K 2.7 lakhs and foreign expenditure as K 1 lakh.

3. **Taunggyi and Tavoy Iron Ore Projects:**

a. For 1955-56, surveys and exploration work are planned for the Taunggyi area, and it is hoped that more ore bodies will be discovered. Development programs submitted by foreign experts and consultants are being considered, and if operation is believed

profitable, a full scale development program will be launched. Capital expenditure for 1955-56 is estimated to be about K 9 lakhs, about half of which will be spent for machinery, equipment and engineering services of foreign firms.

b. Based on the results of their exploration and analyses, Demag is to submit recommendations and proposals for development of the Tavoy area. Capital expenditure for 1955-56 is estimated as K 7.6 lakhs, of which K 4 lakhs will be foreign exchange expenditure.

4. Namyen Wolfram Mines Project: To develop Namyen into an up-to-date mine, there is still much to be done. During 1955-56, expenditure for survey, exploration, development and construction is estimated to be about K 45 lakhs, out of which foreign exchange expenditure will be about K 11.4 lakhs.

5. Kalewa Coal Project: During 1955-56, large scale development works will be carried out. It is estimated that expenditures for development and construction will be about K 24 lakhs. Expenditures for colliery machinery and equipment will amount to about K 44 lakhs. In order to develop Kalewa Coal Mine into a modern colliery, the firm of Messrs. Powell Duffryn Technical Services Ltd. has been engaged. The consulting fees are estimated to be about K 12 lakhs. Total capital expenditure is about K 81 lakhs of which K 56 lakhs will represent foreign currency expenditure. The development and construction of the project will take about four years, and when full-scale mining starts, daily production will be about 1,000 tons of run-of-mine coal. The daily production during 1955-56 is expected to average about 200 tons.

6. Exploration and Development of New Industry: In order to continue prospecting for mineral deposits, machinery and equipment will have to be purchased from abroad and foreign geologists and technicians employed. Foreign exchange expenditure during 1955-56 will be more than half of the total capital expenditure of K 4 lakhs.

7. Yenangyaung Oil Field Rehabilitation Project: In November 1954, the operations of the Burmah Oil Co., shifted from Yenangyaung to Chauk, abandoning many oil wells. In order to relieve unemployment and to prevent the destruction of oil wells and abandoned machinery and equipment, local leaders formed a board for extraction and sale of crude oil. This project has been set up by the Corporation to take over the board in order to prevent:

a. Exploitation of labor.

b. The black market sale of needed parts by "Saing Gowns" labor leaders, and other ruinous operations.

c. Pilferage of crude oil.

Total capital expenditure for 1955-56, for purchase of land, machinery and equipment, and construction of office buildings, godowns, etc., is estimated as K 2.40 lakhs.

M.R.D.C. has only stepped in temporarily to relieve the unemployment situation and will move out when B.O.C. returns.

8. Regional Chemical Laboratory: This laboratory will play an important role in developing mineral resources of the whole of the Shan States. In order to complete the laboratory, more laboratory apparatus and equipment will have to be purchased and installed, a permanent site for the laboratory purchased, and laboratory buildings erected. Total

capital expenditure for 1955-56 is estimated to be about K 3 lakhs, of which K 2 lakhs will be foreign currency expenditure for laboratory equipment.

9. Technical Training Program: In order to continue the program for general technical education and training, formulated by M.R.D.C., K 4.4 lakhs will be required for 1955-56. The most important feature of the training program will be the establishment of a Union School of Mines. Another phase of the program is the sending of trainees to Australia under the Colombo Plan Training Program. About 40 trainees were slated to leave for Australia in May 1955. In 1955-56, about 100 trainees will be sent to member countries of the Colombo Plan.

). CONCLUSIONS AND RECOMMENDATIONS

As indicated in the table of "Annual Budget and Actual Expenditures" of para B 11, progress in the rehabilitation, development and exploitation of mineral resources was not satisfactory in 1953/54, when only 11% of the funds budgeted were expended. In addition, actual expenditures for the first quarter of 1954/55, except for the Namyen Wolfram Mines, are little more than 6% of the 1954/55 budget, or about one-quarter of what they should be.

This is due mainly to the lack of trained and experienced personnel both in technical positions and in the artisan posts. Geologists are required for exploration, mining engineers for planning and operations, and skilled labor for actual mining and processing. Filling this need appears to be the most important immediate step to be taken by the M.R.D.C. Meantime, lacking suitable local candidates, foreigners will

have to be utilized until their places can be filled by skilled Burmans. It is strongly recommended therefore that continued and more concentrated efforts be put on recruiting and training persons to fill the many positions open for geologists, mining engineers, other technicians, and skilled labor. A schedule of long term requirements and a program for instruction and education should be formulated, sanctioned and executed at the earliest possible moment. This is probably the most important matter for the M.R.D.C. to undertake.

As indicated in the KTAM Comprehensive Report, a zinc reduction plant could be operated in Burma so long as the base price of prime western zinc is ten cents per pound or higher. The metals index of the Engineering and Mining Journal (a combined index for copper, lead, zinc, tin, silver, nickel and aluminium; with 1922-23-24 = 100) indicates a gradual price rise for the 1953-54 period. The price of prime western zinc at East St. Louis increased from ten to eleven and one-half cents per pound during 1954, with the latest available quotation being twelve cents per pound as of 20 May 1955. As the Government is taking steps to implement the Kalewa Coal Project, implementation of the Myingyan Project should be initiated in the near future.

MINERAL PRODUCTION

Production of Base Metals and Ores

(Tons)

Calendar Year	Zinc	Tin	Wolfram	Tin and Wolfram	Lead & Lead Concentrates	Iron Ore
1939	59,347	5,441	4,342	5,593	77,180	26,259
1949	none reported	1,469	278	645	1,481	none reported
1952	4,275	1,298	792	1,969	9,093	31
1953	5,975	1,008	655	1,990	9,846	678
1954	11,283	810	430	899	10,105 (6 mos.only)	2,151
1955 (forecast)	12,000	-	-	-	12,000*	-
1960 (goal)	26,000	3,000	2,000	6,000	26,000*	-

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* Forecasts are for refined lead output by the Bawdwin Mine only. Lead ore and concentrates produced by independents may be estimated at at least 2,000 tons additional in 1955, and perhaps 3,000 to 4,000 by 1960.

Petroleum Production

Calendar Year	Crude Petroleum (000 gals)	Motor Spirit (000 gals)	Kerosene (000 gals)
1939	275,673	68,600	139,500
1949	8,671	1,561	1,248
1952	29,280	5,953	9,891
1953	37,647	8,132	12,167
1954 (9 mos.only)	31,874	7,253	10,927
1960 (goal)	140,000	n.a.	n.a.

Production of Precious Minerals

Calendar Year	Gold oz.	Silver (000)oz.	Rubies (000) carats	Sapphires (000) carats
1939	1,026	6,175	212	11
1949	195	75	0.1	2.5
1952	73	155	19	44
1953	647	672	19	34
1954 (6 mos.only)	n.a.	486	15	35
1955 (forecast)		1,200		
1960 (goal)		2,250		

In addition to the major items listed above, Burma also produces a wide variety of other minerals. 1953 output for some of them is listed below:

Item	Unit	Production - 1953	
Amber	lbs.	84	
Jadeite	tons	17	
Spinels	carats	17,709	
Copper matte	tons	80	
Galena	tons	66	
Nickel speiss	tons	494	(12 months ended June 1954)
Antimonial lead	tons	415	(12 months ended June 1954)

IBRD

SUPPLEMENT

To

COMPREHENSIVE DEVELOPMENT PLAN

****

ECONOMIC AND ENGINEERING DEVELOPMENT OF BURMA

****

Prepared For The

GOVERNMENT OF THE UNION OF BURMA

Burma. Ministry of national planning.
" Comprehensive development plan: supplement.
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MANUFACTURING

September, 1955

TIPPETTS ABBETT McCARTHY STRATTON
of Panama Inc.

Consulting Engineers To The
Government Of The Union Of Burma

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No. Ah Nyn 839'00/55
Government of the Union of Burma
Ministry of National Planning
44, Kandawgalay House, Rangoon

Dated the 14th February 1956

Subject: Comprehensive Development Plan —
Transmittal of Supplement, "MANUFACTURING".

Broad systematic planning for the development of the resources of the Union of Burma received its first major impetus with the presentation of the Pyidawtha Programme at the Union Conference in August 1952. This Programme was enlarged and strengthened by the completion in August 1953 of the more detailed "Comprehensive Report on the Economic and Engineering Development of Burma"*. 9A 338.9 B912p

It is the present programme of this Ministry to enlarge and amend the Comprehensive Plan as rapidly as additional planning information and studies will permit. The accompanying supplement, entitled "MANUFACTURING", is therefore to be regarded as the current revision of this subject, amending and supplementing Chapter XXII of the Comprehensive Report of 1953 in the Government's Comprehensive Development Plan.

The official Comprehensive Development Plan of the Government may be considered to comprise at present the following reports:

✓ 1.	Preliminary Report on Economic and Engineering Survey of Burma	January 1952 ✓ 9A 330.9 K72p
✓ 2.	The Pyidawtha Conference (Resolutions and Speeches)	August 1952 ✓ 9A 338.91 B912p
✓ 3.	Comprehensive Report on Economic and Engineering Development of Burma	August 1953 ✓ 9A 330.9 K72c
4.	Summary of Proceedings — Conference on Programme of Development and Reconstruction	February 1954
5.	Supplements:	September 1955

Volume I	Volume II
✓a. Agriculture	✓j. Manufacturing
✓b. Seaports of Burma (Outports Only)	(Others in preparation)
✓c. Inland Waterways	
d. Ocean Shipping	
e. Airways	
f. Telecommunications	
✓g. Electric Power	
✓h. Mineral Industries	
i. Natl. Housg. & Town & Country Dev. Board	

(Mo Myit)
Secretary
Ministry of National Planning

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* Prepared under the auspices of the Ministry of National Planning with funds provided by the Technical Co-operation Administration (U.S.) by Knappen Tippetts Abbott McCarthy, Engineers in association with Pierce Management Inc. and Robert R. Nathan Associates, Inc.

Government of the Union of Burma

Ministry of National Planning and Religious Affairs

Comprehensive Development Plan

Supplement, September 30, 1955

MANUFACTURING

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GOVERNMENT OF THE UNION OF BURMA
MINISTRY OF NATIONAL PLANNING
AND RELIGIOUS AFFAIRS

Comprehensive Development Plan
Supplement, September 30, 1955

MANUFACTURING

A. INDUSTRIAL DEVELOPMENT POLICIES — PROJECTS AND PROGRAMMES*

1. Basic Objective. The fundamental objective of the industrial development programme is to continue to improve standards of living through general increase in the national productivity. General goals for the rate of increase in the gross national product were established in the Comprehensive Report of August, 1953, and specific "first year", "intermediate", and "long range" priorities were recommended (Volume II, page 802-837, and 832-841).

2. Primary Consideration. Because the capital costs of industrial development are large and because the capital resources of the Union are slender, particularly with respect to foreign exchange, it is essential that these resources be spent in such a way as to yield the earliest maximum returns in terms of capital and foreign exchange earnings and economies. This requirement will be seen to favor projects which can be got under way rapidly, have a high rate of exploitation, and produce the largest profit or economy for the least investment of money (particularly foreign exchange) and raw materials. This requirement therefore also favors (a) any project for which a prospective joint or private venturer offers to furnish all or part of the required investment, and (b) projects effecting maximum exploitation of mineral, forest, agricultural, and water resources.

3. Requirement for "Balance". At the same time, the choice of development subjects (enterprises) must be "balanced" in four respects:

(a) So-called "basic" projects needed to make other projects feasible or to minimize the foreign exchange costs of other projects should be implemented early (e.g. building materials);

(b) Requirements for raw materials and of manpower, both labor and management, must be so accommodated as to avoid major dislocations and shortages;

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* In the preparation of this supplement, use has been made of material contained in various memoranda previously submitted to Government.

(c) To prevent inflation, the production for consumer products plus permissible imports of consumer products must be sufficient to satisfy the rising consumer demand stimulated by the domestic expenditures of the programme;

(d) The relation of total expenditures for industrial developmen to other development expenditures of the Government and of the private sector of the economy should be designed to attain the maximum combined yield of investments in all areas

4. Feasibility. A particular project, after having been found admissible in the light of the foregoing considerations, should be thoroughly examined for feasibility before being committed to implementation. In some instances a preliminary determination based on reconnaissance or other incomplete studies may be required merely to authorize the expenditure of funds for a more thorough investigation. The final feasibility determination should rest on the adequacy of the following elements:

(a) Production programme.

(b) Supply of raw materials (assurance of availability).

(c) Plant and facilities requirements including

  i. Site,
  ii. Structural Facilities,
  iii. Processing Scheme (Production Flow Plan),
  iv. Processing Equipment (Production machines and accessories),
  v. Special Maintenance Facilities,
  vi. Laboratory & Research Facilities,
  vii. Utilities and Services,
  viii. Access Facilities,
  ix. Delivery Facilities,
  x. Traffic and Transportation Facilities,
  xi. Community Facilities.

(d) Plan for construction, and for procurement and installation of equipment.

(e) Plan for management (operating organization) and for the mobilization and training of the operating staff (assurance of availability).

(f) Market and proposed distributing outlets.

(g) Cost-benefit considerations.

(h) Financial structure, method of financing, disposition of earnings.

(i) Administration and schedule of implementation including how, when, and by whom

- i. Project master plan will be prepared,
- ii. Architect-engineer plans will be drawn,
- iii. Equipment procurement specifications will be prepared, tender notices issued, tenders analyzed,
- iv. Site investigations, surveys, selection, and procurement will be undertaken,
- v. Construction will be supervised,
- vi. Construction will be performed,
- vii. Equipment will be procured,
- viii. Equipment will be installed,
- ix. Operating organization including maintenance and plant engineering, sales, distribution, and traffic will be mobilized, trained, and managed,
- x. Products will be distributed.

(j) Status of Complementary Projects.

5. Size of Project. Both small and large industries have their place. Present emphasis upon small industries and so-called "Cottage Industries" is well placed for the reason that these industries provide almost unlimited scope and variety with which to increase rapidly the productivity of large segments of the population. This emphasis should be continued and increased.

6. Special Conditions. In addition to the foregoing considerations, which bear upon the economic suitability and practical feasibility of a particular project, selection may sometimes be influenced by such social-political factors as the welfare requirements of certain segments of the population, the political demands of a constituency, direct requirements for defense, and requirements for national self-sufficiency in the supply of commodities which might be interrupted by war or other international maneuvering beyond the control of Burma. Projects selected on such grounds in disregard of economic and feasibility factors must, of course, be recognized as wasteful of both capital and natural resources, and should be sanctioned only if the necessity can be shown to outweigh the loss.

B. INDUSTRIAL DEVELOPMENT POLICIES -- OPERATIONS AND MANAGEMENT

Further attention is needed to present administrative and operating policies in connection with the industrial development program in order to prevent waste of resources, delays, possible failures, and the increase of capital cost due to these factors. It may be noted that manufacturing project are carried on by the Tile Factory Board (Ministry of Public Works), Special Projects Implementation Board (Ministry of National Planning), State Timber Board (Ministry of Agriculture and Forests), and others, as well as by the Ministry of Industry and the Industrial Development Corporation, and that mineral resources, forest resources, and agricultural resources are developed, respectively, by the Mineral Resources Development Corporation, the State Timber Board, and Agricultural and Rural Development Corporation. In general, projects of agencies other than the Ministry of Industry and the Industrial Development Corporation are not treated in this supplement.

1. Organization. Broad recommendations were made in the Comprehensiv Report (Volume I, page 83 to 86) to the effect that the development corporatic should be essentially independent of the Ministries except for responsibility to a Minister in important policy matters, that they should avoid direct operations, confining themselves to initiating, financing, and policy level support of subsidiary or otherwise sponsored operating bodies. The needs for independent funding powers, adequate staffing, and internal organization structure adapted to the efficient execution of function were emphasized. However, the recommendation then made, that members of boards of directors should be full time appointees, should be replaced by a more practical and effective requirement that full executive responsibilities rest with a directo or manager, the board confining itself to policy guidance, and periodic consideration of major questions.

Thus far, little progress has been made toward achieving these objectives. However, re-organization of the Industrial Development Corporatio has been planned in detail and is under consideration. Extracts of the proposed re-organization plan are enclosed as Appendix I. It will be seen that the proposed scheme reflects emphasis upon the following features:

(a) An objective functionalized plan.
(b) Centralization of similar responsibilities.
(c) Written policy manuals for the Corporation and for each of the major divi
(d) Operation or procedure manuals for each division, department and section.
(e) Job descriptions for all the major positions within the Corporation.

The organization is simple, direct and easily understood. Lines of authority are clearly shown. Delegation of authority is indicated in the job descriptions. Expansion is possible within the proposed structure without any need for reorganization. Coordination can be achieved by the use of the committees indicated, provided that weekly meetings are held by the Director General with all his division heads.

No mention was made in the reorganization plan of the various subsidiary boards such as the sugar, cement, and brewery boards nor of the implementing committees, steel, jute, and sugar. These will be the subject of another report. In general the same individuals are placed on too many boards and committees. This leads to confusion in the mind of the individual, to a lack of decisiveness, and to consequent costly delays.

With respect to the management of individual projects or groups of projects, it is fundamental that these should be given corporate responsibilities (usually of a subsidiary nature) at the earliest practicable date after the enterprise has been approved.

The primary justification for the use of the government corporation or board in preference to the conventional government department for the conduct of production enterprises is that it provides a structure in which all functions such as purchasing, personnel management, production policy, and marketing are unified to further the efficient and successful accomplishment of the objectives of the enterprise. The importance of this independently integrated structure has been learned from long experience with the impracticability of attempting to perform highly specialized functions under the handicaps of rigid rules, procedure, and policies laid down for other purposes or without knowledge of particular requirements and the absolute necessity for flexibility and unity of control in modern production operations.

This is not to say that Government should not exercise policy control over its boards and corporations. There is perhaps an urgent need for just such policy utterance in the form of broad legislation defining the functions, procedures for establishment, and legal prerogatives of such boards. At the same time, it may be supposed that government boards are and properly should be subject, generally, to the same public laws and government controls that apply to private firms and individuals; for example, foreign exchange control, labor legislation, welfare legislation and the like. However, to apply to boards and corporations all or most of procedures and rules that govern the conventional government department is to defeat the intent of the corporate structure.

This is especially true in regard to the payroll provisions. At presen the Boards are limited by the "Final Report of the Pay Commission 1947". This report deals entirely with government service. Its relation to private enterprise or to a government manufacturing establishment is, in the year 1956, outdated.

In recognition of the need for definitive policy with respect to this subject, it is recommended that a working committee be established to prepare basic legislation defining in broad terms the role and prerogatives of the corporate body (board) in government and the conditions which should be fulfilled when such bodies are formed. (Such legislation might, for example, require that charters for such bodies each contain definitive provisions indicating the extent and nature of the proposed autonomy).

2. Procurement and Marketing. Industrial projects, being business type enterprises dependent for their success upon the close coordination of all operations and processes from raw materials to market, require unified control and subordination of both the procurement and marketing functions to the interests of the project.

(a) Analysis of Markets. The scope (production capacity) of a project, in fact the whole project concept, rests on the analysis of existing and potential markets. The existing market may be fairly readily evaluated from available statistical data and by canvassing representative distributors or consumers. The appraisal of the potential market may be a much more complex study. Here the distributing organization, if any, is called upon to evaluate customer and potential customer response to a new or modified product, either prior to its introduction or through the introduction of trial or pilot model and samples. It must also take into account the method of trading in foreign countries and whether individual or centralized buying is practiced.

The analyst must consider consumer habits and preferences, the methods of advertising, display, and demonstration available, the field organization required or available, supporting developments that will be required (such as servicing, power, supply of parts and fuel, instruction, transportation, general education), packaging, and the special appeals, characteristics, uses, adaptability, and modes of operation or employment of his product. Where a monopoly is enjoyed there is a duty to see that quality keeps pace with outside developments.

The analyst must also take into consideration the relation of his product to other products which may be planned or actually in distribution, and which would tend to influence the response to his own product. He must evaluate the monetary resources of his potential customers, and in some cases seek means of increasing such resources. In some cases the market analyst must seek the further development of the product in order to create an application where none existed before.

(b) Production Planning. The determination of how much to produce and when and what storage levels to provide and maintain depends upon comparisons of production costs and other production characteristics with the anticipated ability of the market to absorb the output, taking into account probable seasonal fluctuations and expansion as derived from the market analyses. Raw materials procurement must be coordinated with production. Unnecessarily large stocks of either raw materials or finished products represent idle capital, invite deterioration, and are a charge against the economic efficiency of the project. Reductions from maximum production need not represent employment reductions, but if the project is properly flexible may permit a shift in emphasis as between products, a long term planned change of products, or the immediate conversion to a better product.

Such shifts in production emphasis and schedules must be swift and responsive to both the procurement and sales markets if the enterprise is to be an asset to the national economy. Changes may stem from developments in the consumer requirement, from technological progress, from changes in the costs and properties of raw materials, or from changes in other costs of operation. For continued economic operation, changes in costs and in processes must be reflected in prices, in product modifications or in production schedules. The evaluation of all these factors in conjunction with production planning requires the closest liaison between the production management staff and the distribution staff from whom must come the facts and information for the appraisal of the markets response and upon whom will fall the burden of promoting acceptance of price and product changes.

(c) Exploitation of the Market. Both anticipation of production and afterward the task of fully exploiting the market, that is, the task of sales and promotion is of such dominant importance that it may, in the case of consumer products, outweigh the manufacturing operation in cost and management effort. It may be regarded as normal that the sales and promotion costs of a manufactured product may vary from a range of one to ten per cent of the sales price for industrial products with a select market to a range of one hundred to one thousand per cent of the production cost for consumer goods marketed to the general public.

The functions performed by the sales and promotion groups is vital both to the individual enterprise and to the general economy. The propensity of human beings to resist change is so strong that, speaking in the mass, rational considerations seldom operate to effect even the most obviously desirable changes without outside stimulus. Even for the supposedly scientific industrial consumer, a free demonstration and a trial period are often required to convince of the desirability and advantages of a new product. But for the domestic consumer it is sometimes necessary to generate a sweeping, universal acceptance of a new product before the individual will switch from hostility or indifference to demand.

It is probably safe to conclude that an underdeveloped society will not rapidly assimilate the products of industry merely because the production capacity is provided. There must be also a major organization of effort to arouse interest, to rationalize advantages, to demonstrate, and to explain how easily the product can be made available. All the forms of advertising are required, according to the type of product: newspapers, posters, attractive displays, exhibits, radio announcements, cinema notices, attractive packaging, contests, sample distribution, and services to educational institutions. The preparation of promotional materials and programs of this kind requires an intimate knowledge of both the product and its manufacture, and close liaison with production management. Collectively, the total impact of the advertising and sales effort in an industrial country may rival the influence of normal educational programs, and should be an even more directly significant factor in aiding the assimilation of industrial expansion in an underdeveloped country.

(d) Accommodation to the Market. The sales and distribution organization provides another vital service in being instrumental in bringing about accommodations which make it possible for the user to overcome obstacles to obtaining and using the product. One of the secrets of the success of industralization elsewhere has been the recognition by the manufacturers that they must carry their products to the consumer's door, install them, service them, and generally make it unnecessary for the consumer to lift a finger to realize fully the advantages of the product promptly and without delay. It is the responsibility of the marketing organization, for example, to recognize the kind and number of distribution points to be established, to demand that management place the goods where most needed and in adequate quantities, to see that new shipment are requested and received in time, to see that surplus stocks are not carried and permitted to deteriorate, and to insure that customers receive courteous, prompt, and cooperative attention.

> This means that the selling organization is also an information survey team that is constantly reporting consumer problems to the production management. Modifications in packaging and handling, changes in quality, adaptations in weight, size, and operating characteristics — all are requirements which must be promptly reported to and accommodated by management if the product is to survive. The sales and distribution organization should also be first to recognize the customer's need for financing facilities and to demand a program providing such assistance.

In the light of the foregoing considerations, it is suggested that the Civil Supplies Management Board continue its present course as a preferred distributor, but not the sole distributor, of such supplies as it can efficiently handle through its developing channels. On the other hand, it is strongly recommended that each productive enterprise such as the Sugar Board, the Steel Products Plants, the Rice Bran Oil Plant, in short, each corporate enterprise, be given management staff in the fields of production planning, marketing and sales, with responsibility and authority to develop marketing channels in addition to those of the Civil Supplies Marketing Board if required for the normal cultivation and full exploitation of the market. In the case of the Industrial Development Corporation, probably also in other cases, the responsibility and authority for performing these functions has already been established by the enabling act and need only be re-confirmed to become effective.

This arrangement would appear to have many advantages. The corporate enterprise would retain all the integral functions essential to its operating efficiency, including its intimate contact with the consumer. The Civil Supplies Marketing Board, as a preferred distributor for industry could continue to develop along whatever lines prove most promising. The corporate enterprise would prepare and furnish to Civil Supplies as well as to its other outlets the promotional material (if any) appropriate to its products, and would provide advice and assistance to all distributors as to sales techniques, displays, competitions, and the like.

In practice, Civil Supplies would place its orders with the industry much as any other customer, at the same time keeping the industry informed of the product destinations or even calling for direct deliveries by common carrier or by industry transport, whichever, in each individual case, afforded the greatest advantage to Government.

Some enterprises will have important foreign marketing potentials. While the facilities of the foreign offices of the Government should be utilized in exploiting these markets, the responsibility for promoting and sponsoring their development most logically centers in the management where the entire subject of foreign markets has had to be exhaustively analyzed in the course of the project and production planning. Only the management can properly prepare promotional information and the schedules and objectives to be met in calling for disposal of greater or reduced exports and in correlating these with production programs. In some cases special sales or barter missions or agents may be warranted, and these should be planned by and responsive to the requirements of the project management as well as coordinated with other marketing and barter activities of the Government.

3. Pricing. It will normally be expected that the various enterprises of the industrial development program will repay their costs and operate at a profit. In general, therefore, industries should be allowed to fix their own prices, subject to the profit policy considerations under which each individual industry is established, and subject to review and decision by higher authority in cases having a direct bearing on the current economic decisions of the Government. Some enterprises will be joint ventures for which pricing must be such as to guarantee profits to the partners in the venture. In other cases the Government may wish to experiment with different profit margins in order to determine at what levels the net gain to the public is greater through reduced consumer costs or through increased revenues to the enterprise. The success of each enterprise will also depend upon its having a sufficient revenue to undertake progressive personnel programs, to provide employment incentives and social security schemes, and to undertake plant modernizations and expansion. In unusual cases the Government may choose to operate an enterprise at a loss, either to effect a net economy in foreign exchange, to introduce a product, or for strategic or political reasons. Determination of prices, f.o.b. factory, retail, overseas, and other, would usually be taken in consultation with the distributors, including the Civil Supplies Management Board.

C. PROGRAMME STATUS

1. The 1953 Programme. For convenient comparison, the projects recommended in the Comprehensive Report of 1953 may be summarized here. Basic projects for producing materials needed for other projects or for conserving foreign exchange were placed in a "First Year Plan". Less urgent projects were placed in an "Intermediate Program", and the remaining projects were placed in a third group for future study. The following tabulation indicates the first two groupings:

TABLE I

Projects as Recommended in 1953

FIRST YEAR

- Steel Products
- Joinery
- Expansion of Cement, Asbestos-Cement Products
- Rice Bran Oil Extraction
- Jute Textile & Bag
- Bambo Pulp & Paper
- Ammonia-Based Fertilizer

INTERMEDIATE

- Calcium Carbide & Vinyl Plastics
- Paper Bag
- Additional Cotton Spinning & Weaving
- Sugar Refinery & Sugar Chemicals
- Veneer and Plywood
- Wood Waste Wallboard
- Furniture Factory
- Wood Waste Chemicals
- Tannin & Cutch Extraction
- Paint & Varnish
- Rubber Products
- Lime
- Gypsum Products

In all, 45 projects were listed in the 1953 Report for consideration in the Industrial Development Programme. The Pyidawtha Programme called for the same industries.

2. Action by Implementing Agencies: The primary implementing agency for medium and large scale manufacturing industries is the Industrial Development Corporation although there are several Boards undertaking special projects. Sixty-one industrial projects have been adopted by the Industrial Development Corporation for implementation. Three others are in varying stages of development by other agencies. The Cottage and Small Scale Industries Board has ten small plants operating for training or pilot plant purposes. These include sugar making, condensed milk, pottery, tiles, textile weaving, textile printing, hand paper making, electro plating and anodyzing, and lacquerware making. Planning is proceeding on

dry cells and accumulators, and bamboo utilization. Further details of these projects are printed in Appendix II.

Implementation of all industrial development projects has been delayed to some extent largely because of lack of sufficient qualified staff to act on the proposals and process them through the various stages of development to culmination. The program is an ambitious one and large for even an old and experienced industrial development agency. The difficulty of forming an organization of sufficient capacity to handle Burma's program is accentuated by the paucity of nationals with experience in industrial engineering, management, and operation. The Japanese reparations program may somewhat relieve this situation. Joint ventures with private enterprise in which foreign skills are brought in will also help. Meantime, efforts must be continued to decentralize management by delegating appropriate authority, with suitable checks, to small groups created for individual industries. Overall supervision and financial responsibility would, of course, remain with the Government.

A resume of the status of the several projects of the Industrial Development Program is presented as Appendix III.

3. Organization, Management, Operation. The implementation of many projects is being delayed because of the lack of sufficiently qualified personnel. This problem has been approached at all levels. Reports have been sent to the various properly interested ministries yet there is a great lack of coordination in the overall planning.

Extensive work has been done with the curriculum committee of Rangoon University. Plans for Technical Institutes and artisan training have been developed. Apprenticeship programs are being expanded. Meanwhile State Scholars and Deputationists are being sent to various countries for further study.

Plans, programs and schedules have been established for various "In-service" and "On-the-job" training. This training covers foremen and supervisors, maistries and jamadors, skilled and unskilled workers. In certain instances, especially at the foreman and skilled worker level, contacts have been made abroad for training in special fields. Many in these categories have already begun their training abroad.

D. RECOMMENDED PROGRAMME

In the light of the requirements for balance as described in Section A 3, particularly in view of the desirability of emphasizing projects which will facilitate other projects and which will yield maximum early returns in foreign exchange, it is believed that additional priority should be given to projects which will accelerate the exploitation of natural resources. In particular, it is believed that allocations should be made to the Integrated Forest Industries Project, and that a project for an Integrated Construction Materials Industry should be developed. Other basic and semi-basic industries should also be accelerated, and particular attention is invited to the desirability of furthering the introduction of a glass container plant, which would serve many other projects; the establishment of a cast iron pipe foundry, which would contribute to the economy of the iron and steel industry while meeting many construction requirements; and the development of facilities for the conversion of molasses to power alcohol, a project that would employ otherwise waste products of sugar refining and result in a major augmentation of fuel supplies.

The "Intermediate Programme" as now recommended in lieu of that shown in Table I, for development during the next three- to five-year period therefore includes the following projects:

TABLE II
Current Recommendation
INTERMEDIATE PROGRAMME

Additional Cotton Spinning & Weaving
Alcohol from Sugar
Integrated Forest Industries
Gypsum Products
Further Extension of Cement Production

Central Cotton Textile Finishing Mill
Expansion of Deep Sea Fishing
Pig Iron and Cast Iron Pipe
Glass Bottles and Containers
Mechanization of private brick industry (through loans)

Accelerated Agricultural Programme for Production of Raw Materials: Jute, Sugar, Cotton

Integrated Construction Materials
Paper Products (only after basic paper manufacture is under way)

B. GENERAL CONCLUSIONS AND RECOMMENDATIONS

In addition to the programme for development recommended in the preceding paragraphs, there is a conspicuous need for further attention to the following aspects of the industrial programme:

1. Comprehensive Planning. Project plans should be comprehensive as to scope, but not necessarily complete as to detail, before definitely committed to implementation. In particular, consideration should be given to the availability and flow of raw materials, to the management and financial structure, to the production programme, and to distribution and marketing objectives. Clear-cut cost-benefit relations should be presented. Prospective implementation, construction, mobilization, and operating schedules should be formulated. Included in the prospective implementation schedule should be a chart of the Capital accounts, an outline of the reporting procedure, and an implementing committee budget. All supporting requirements such as access and communications facilities, transport, and water supply should be anticipated. Residential areas to be used for the plant's personnel should be planned and built concurrently with the planning of the actual factory.

2. Unified Project Management. Groups of plants should be coordinated under a common business management; for example, integrated forest industries, integrated construction materials industries, integrated textile industries (to include spinning, weaving, design, dyeing, printing, and finishing), the iron and steel industry, paper and paper products, and glass products.

Overall projects should include the small scale industries and the pilot plants, which could either be absorbed or used for research or training purposes; e.g., the sugar mill at Bhamo, the condensed milk operations in Maymyo, and the tile factory in Moulmein.

Individual projects should have full-time leadership. All constructional elements should be coordinated under one construction management, preferably under a general construction contractor or an equivalent government construction organization.

3. Coordination in Manpower Planning. If initial project plans are complete, they will include a schedule for mobilization (recruiting and training) of personnel. It is the responsibility of the individual project supervisors to see that manpower requirements are met sufficiently ahead of

the operating dates to ensure the readiness of the trained organization. Centralized responsibility for coordinating all such requirements on the staff of the Industrial Development Corporation is required to monitor this function. In addition, general manpower planning and coordination, including the monitoring of the manpower requirements of all departments, should be one of the functions of the Ministry of National Planning and the Economic and Social Board.

4. Support of, and Adequate Delegation of Authority to Personnel Charged with the Supervision of Projects. Such persons should have clear-cut direction or should be operating under explicit corporation charters. Delegations of authority should be written and transmitted before the individuals initiate their work, and all policy based upon explicit corporation charters should be definitely written and understood by all individuals concerned within the corporation. Their request for budgets and personnel sanctions should be promptly honoured; also, full weight of higher authority should be placed behind the processing of import licenses, customs clearances, and other regulatory papers to permit execution of the work on schedule.

5. Reorganization of Industrial Development Corporation. It is further recommended that immediate attention be given to the reorganization of the Industrial Development Corporation along lines indicated in Appendix I.

6. Full Responsibility for Corporate Bodies. It is recommended that the Government adopt as a general policy the principle that industrial and similar productive enterprises formed as corporate bodies should in general exercise the normal prerogatives of government corporations and should be organized and operated in such a way that the individual enterprise carries the primary responsibility for all aspects of its program from procurement to marketing.

7. Basic Legislation should be prepared defining in broad terms the role and prerogatives of the corporate body (board) in government and the conditions which should be fulfilled when such bodies are formed.

8. Cottage and Small Scale Industries should receive still further emphasis and assistance as a means of accelerating the increase in productivity of large segments of the population.

APPENDICES

I Proposed Organization -- Industrial Development Corporation

II Cottage and Small Scale Industries Board

III Industrial Development Programme Project Status

14/2/56

APPENDIX I

Proposed Organization

Industrial Development Corporation

Prepared By

Dr. J.C.G. Seidl

Chief Industrial Advisor

16/2/56

INDUSTRIAL DEVELOPMENT CORPORATION

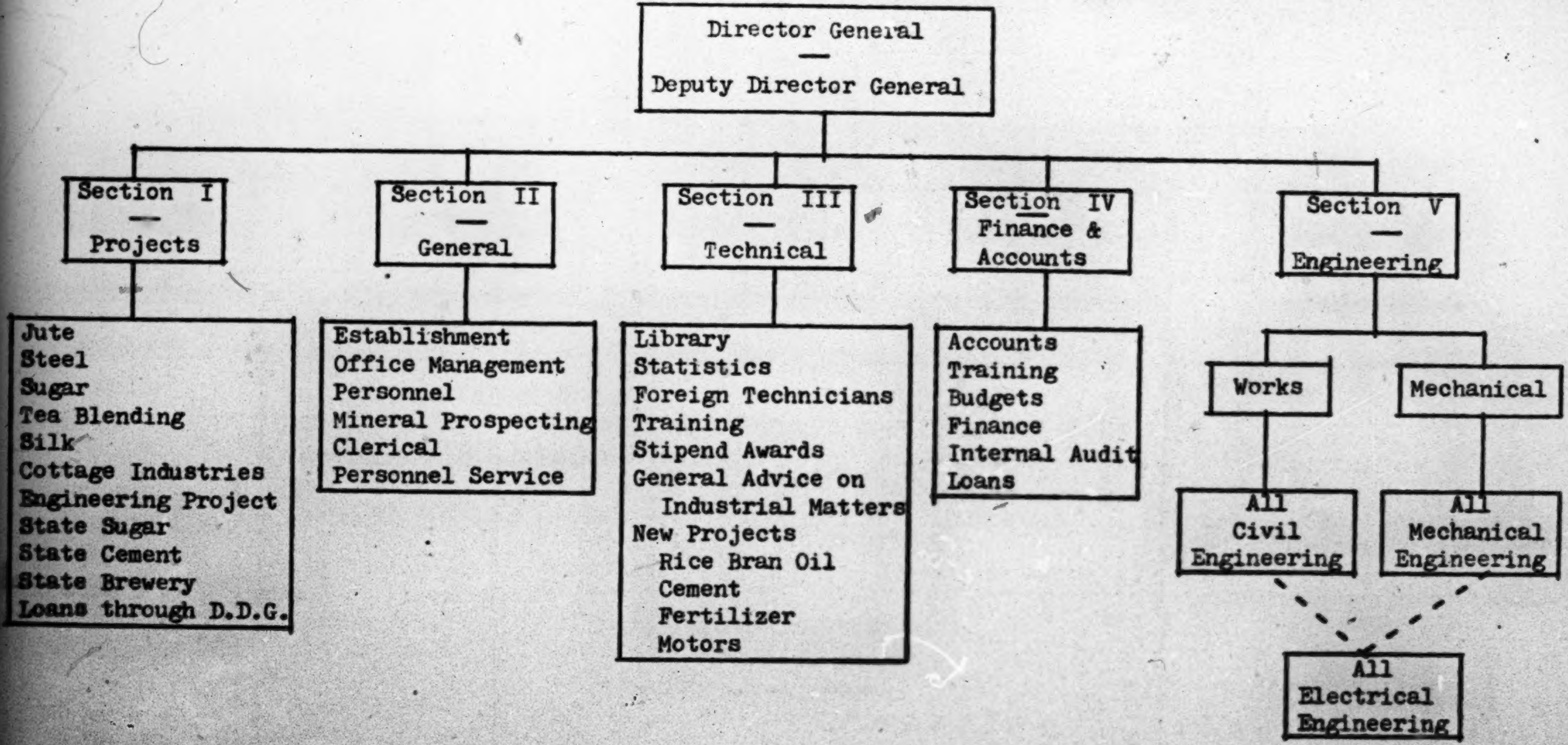
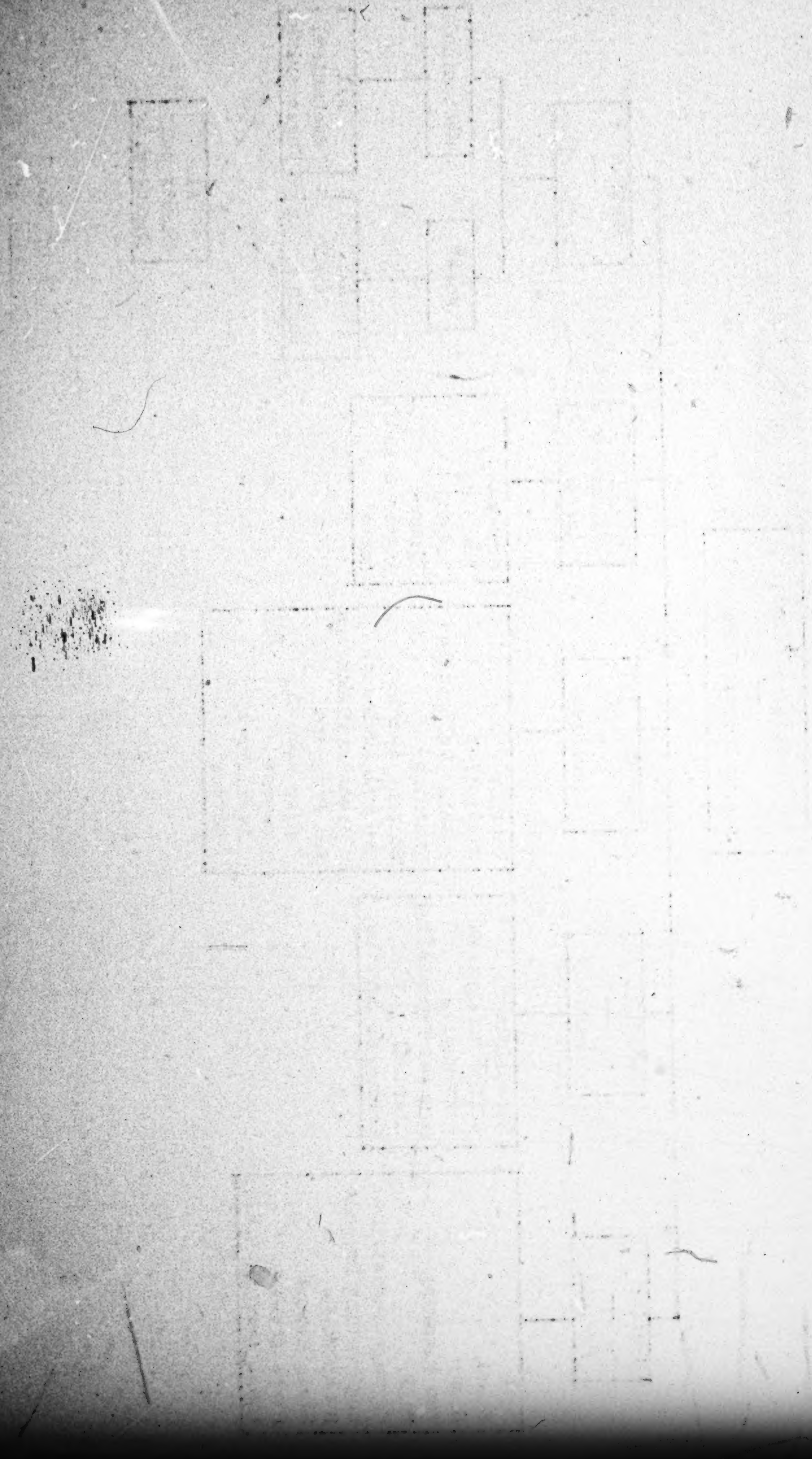
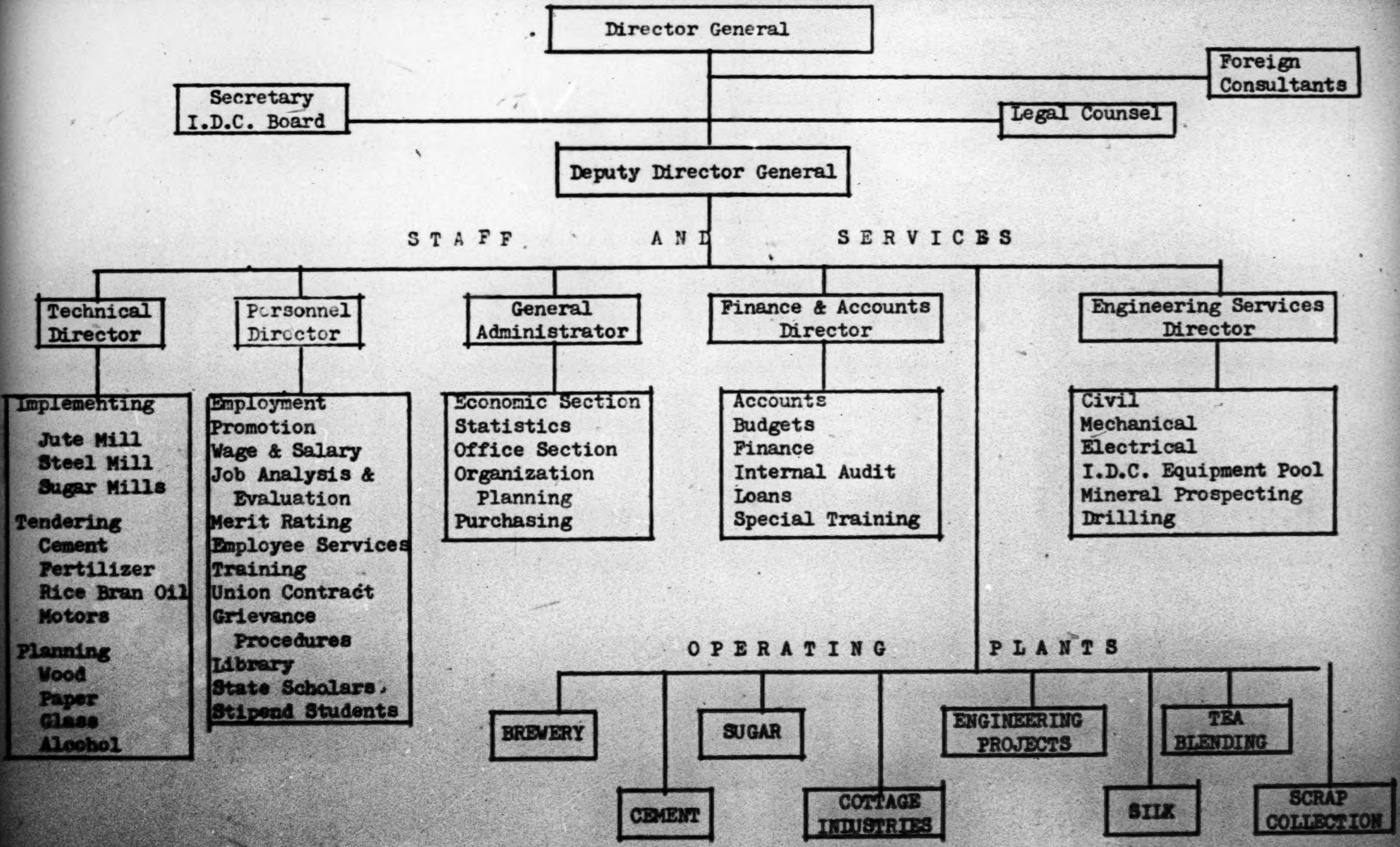

Director General
—
Deputy Director General
Section I
—
Projects
Section II
—
General
Section III
—
Technical
Section IV
Finance &
Accounts
Section V
—
Engineering
Jute
Steel
Sugar
Tea Blending
Silk
Cottage Industries
Engineering Project
State Sugar
State Cement
State Brewery
Loans through D.D.G.
Establishment
Office Management
Personnel
Mineral Prospecting
Clerical
Personnel Service
Library
Statistics
Foreign Technicians
Training
Stipend Awards
General Advice on
Industrial Matters
New Projects
Rice Bran Oil
Cement
Fertilizer
Motors
Accounts
Training
Budgets
Finance
Internal Audit
Loans
Works
Mechanical
All
Civil
Engineering
All
Mechanical
Engineering
All
Electrical
Engineering

Chart No. 1
Organization of I. D. C.
according to
Director-General's Directive
14th July 1955

5P-467
16/2/56

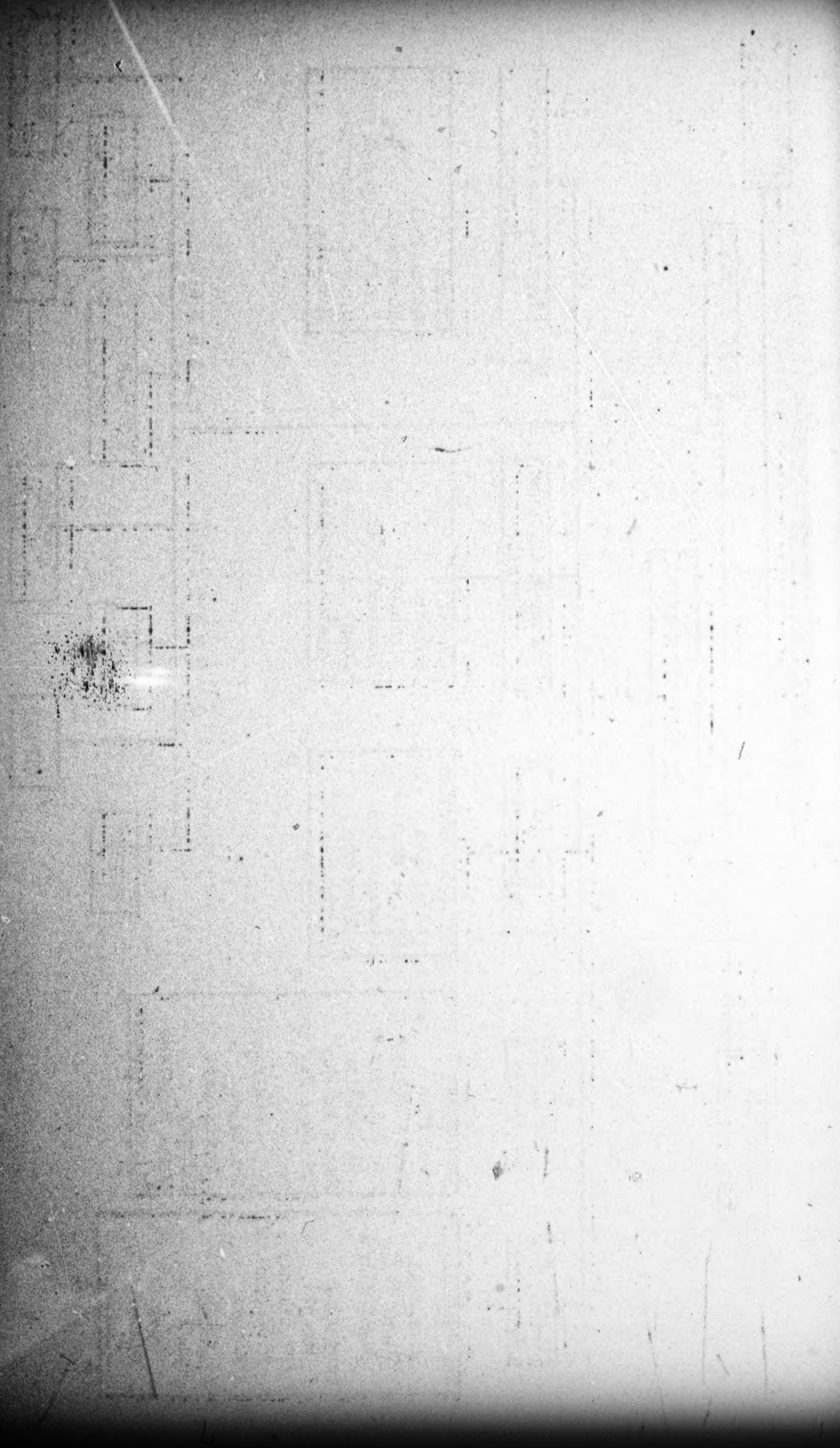


INDUSTRIAL DEVELOPMENT CORPORATION


Director General
Secretary I.D.C. Board
Legal Counsel
Foreign Consultants
Deputy Director General
STAFF AND SERVICES
Technical Director
Implementing
Jute Mill
Steel Mill
Sugar Mills
Tendering
Cement
Fertilizer
Rice Bran Oil
Motors
Planning
Wood
Paper
Glass
Alcohol
Personnel Director
Employment
Promotion
Wage & Salary
Job Analysis & Evaluation
Merit Rating
Employee Services
Training
Union Contract
Grievance Procedures
Library
State Scholars,
Stipend Students
General Administrator
Economic Section
Statistics
Office Section
Organization Planning
Purchasing
Finance & Accounts Director
Accounts
Budgets
Finance
Internal Audit
Loans
Special Training
Engineering Services Director
Civil
Mechanical
Electrical
I.D.C. Equipment Pool
Mineral Prospecting
Drilling
OPERATING PLANTS
BREWERY
CEMENT
SUGAR
COTTAGE INDUSTRIES
ENGINEERING PROJECTS
SILK
TEA BLENDING
SCRAP COLLECTION

58-467

Chart No. 2
Proposed



Director-General

A. Basic Functions

In accordance with the Industrial Development Corporation Act, 1952 (Act No. 43 of 1952) Section 6, 2 the Director-General shall be the Chief Executive Officer of the Corporation. In the absence of the Chairman of the Board of Directors he shall preside at all meetings of the Directors. He shall be ex-officio a member of all committees, and shall have general and active management of the business of the Corporation, and shall see that all orders and resolutions of the Board are carried into effect.

B. Organizational Relationships

1. Framework Relationships.

   The Director-General is responsible to the Board of Directors.

2. Individuals Reporting to the Director-General.

   a. Deputy Director-General

   b. Director of Finance & Accounts

   c. Technical Director

   d. General Administrator

   e. Personnel Director

   f. Engineering Service Director

   g. Any others - (list)

C. Specific Responsibilities

1. Management Responsibilities.

a. To plan, develop and approve specific policies, programs and methods, designed to implement the general policies established by the Board of Directors and to direct their administration and execution.

b. To see that subordinates are delegated adequate authority to carry out their responsibilities and objectives but that appropriate limitations of their authority are defined in writing and clearly understood with respect to policy, contractual commitments, expenditures and action affecting personnel.

c. To engage in long range planning, taking full advantage of the long range potentials of the Corporation.

2. Corporate Responsibilities.

a. To keep the Board of Directors fully informed on the conditio of the Corporation and on all factors influencing it.

b. To suggest officers for the Corporation for appointment by the Board of Directors.

c. To consult with the executive committee in intervals between meetings of the Board of Directors on matters regarding authority of the Board or of special interest to it.

3. Organizational Responsibilities.

To develop, maintain and administer a sound plan of organization; initiate improvements and enforce the organization plan of the Corporation initiate control and approve the addition, elimination or alteration of any major position in the Corporation.

4. Personnel Responsibilities.

a. To establish a basic personnel policy.

b. To initiate and control policies of selection, promotion, demotion and removal of any member of management.

c. To set up a personnel inventory, an executive development program, evaluation and succession policies.

d. To approve appointment and retirement of officers and major members of management.

e. To initiate and control a program of rational wage and salary administration.

f. To approve basic employee policies and relationship with organized labor.

g. To approve managerial and employee benefit and vacation plans

5. Financial Responsibilities.

a. To supervise annual and quarterly budgets.

b. To control the profitability of operations.

c. To maintain proper inventories.

d. To guard the long-run solvency and capital structure of the Corporation.

6. Committee Responsibilities.

a. To Chairman the following committees:

(List of Committees)

b. To serve on the following committees:

(List of Committees)

7. Public Responsibilities.

To direct and participate in such outside activities as are deemed advantageous toward enhancing the prestige of the Corporation; fulfilling the public obligations of the Corporation as a member of industry, the community and the nation; broading the general public's knowledge of the scope of the operations of the Corporation.

D. Authority

The Director-General is authorized to take any reasonable action needed to carry out the responsibilities delegated to him so long as such action does not deviate from established policies and practices as defined by the Board of Directors or conflict with sound business judgment, except for specific limitations placed upon his authority by the Board of Directors.

E. Accountability

Criteria for exercise of Responsibilities.

1. To obtain the optimum utilization of expenditures.

2. To assure fulfillment of operation budgets and foster economy.

3. To assure efficient management throughout the Corporation.

4. To obtain the optimum return on the investment by this Corporation over the long run.

Deputy Director-General

A. Basic Functions

In accordance with the Industrial Development Corporation Act 1952 (Act No. 43 of 1952) Section 6, 2 g the Deputy Director-General shall have primary responsibility for the actual operating companies, he has authority over all organization levels pertaining to his particular operations group. He is responsible for coordinating all major activities of his operating group and for obtaining results in keeping with the Corporation's objectives and policies. He directs the activities of the operating group and of the general managers of the operating divisions.

B. Organizational Relationships

1. Framework of Operations.

   The Deputy Director-General reports to the Director-General.

2. The following individuals report to the Deputy Director-General.

   a. General Manager - Cement Plant - Thayetmyo.

   b. General Manager - Sugar Plants, Zeyawaddi, Pyinmana, Namti.

   c. General Manager - State Brewery and Distillery, Mandalay.

   d. General Manager - Cottage Industries.

   e. General Manager - Tea Blending Factory.

   f. General Manager - Silk Project.

   g. (List other managers).

C. Specific Responsibilities

1. Management Responsibilities.

   a. To direct the operating group in accordance with established policies and objectives.

   b. To assist the Director-General in developing Corporation objectives and in formulating policies to achieve them.

   c. To analyse and appraise regularly and systematically the effectiveness of all operating plants under his control to see that Corporation policies are observed and to take prompt corrective action as needed.

d. To see that executives under his direction are delegated adequate authority to carry out their responsibilities and objectives, but that appropriate limitations of their authority are defined in writing and clearly understood with respect to such matters as policy, expenditures, contractual relationships and action affecting personnel.

2. Organization Responsibilities.

a. To see that the approved basic plan of organization is established and observed.

b. To establish sound organization structure in the operating group.

c. To see that policy and procedures guides covering the activities of the operating groups are developed, written and maintained in manuals.

3. Accounting and Financial Responsibilities.
(With advice and assistance of Director of Finance and Accounts)

a. To establish sound accounting and financial administration in the operating group.

b. To review budgets of the operating group and to make modifications and recommendations as he deems appropriate before their submission to the Director-General.

c. To analyse and report to the Director-General the results of the operating group's operations.

4. Legal and Corporate Responsibilities.
(With the advice and assistance of the Legal Counsel)

To see that all agreements are in accordance with Corporation Polic

5. Technical and Research Responsibilities.
(With advice and assistance of Technical Director)

To provide facilities for basic and applied research.

6. Manufacturing Responsibilities.
(With advice and assistance of Technical Director)

To provide for manufacturing activities - plant, operation and services.

7. Human Relation Responsibilities.
(With advice and assistance of Personnel Director)

a. To write administrative directives for carrying out the Corporation's personnel policy.

Deputy Director-General (cont'd)

b. To write administrative directives for the selection, promotions, demotion and removal of members of management under his direct control.

c. To recommend for approval of the Director-General competent executives for the operation of the operating group under his control, to see that they are properly trained and fully informed, and to coordinate the efforts of all executives reporting to him.

d. To assist in setting up administrative procedures for wage and salary administration and the retirement and succession of members of management.

e. To participate in the formulation of managerial and employee benefit and vacation plans.

f. To participate in the formulation of relationships with organized labor.

8. Committee Responsibilities.

To serve on the following committees:

(List of Committees)

9. Public Relationships

To promote satisfactory relations with government agencies, industry or trade groups, press and the general public.

D. Authority

The Deputy Director-General is authorized to take any reasonable action necessary to carry out the responsibilities assigned to him so long as such action does not deviate from established corporation policies and is consistent with sound business judgment except for specific limitations placed upon his authority by the Director-General, the By-laws of the Corporation or the Policy Guide.

E. Accountability

a. To set and meet profit objectives of the operating group.

b. To seek constantly for improvements and cost reduction.

c. To review staff and operating managers reports of progress, problems and solutions of problems within their respective areas of responsibility.

d. To build morale in the organization.

Director of Finance & Accounts

A. Basic Functions.

In accordance with the authority delegated by the Director-General, the Director of Finance and Accounts shall control the active management of all financial affairs, as well as the formulation of all accounting systems, standards and procedures for the Corporation, and the operating group. He shall also pass on all application for loans from the Corporation.

B. Organization Responsibilities.

1. The Director of Finance and Accounts reports to the Director-General.

2. The following individuals report to the Director of Finance and Accounts:

   a. Finance Officer
   b. Accounts Officer
   c. Loans Officer
   d. List others.

C. Specific Responsibilities.

1. Management Responsibilities.

   a. To plan and develop specific financial policies and objectives.

   b. To assist the Director-General in developing Corporation policies.

   c. To analyse and appraise regularly and systematically the effectiveness of all operations of the Corporation under his control and that of the operating group.

   d. To see that officers under his direction are delegated adequate authority to carry out their responsibilities but that appropriate limitations of their authority are defined in writing and clearly understood.

2. Organization Responsibilities.

   a. To see that the approved basic plan of organization is established and observed.

   b. To establish a sound organization structure in his division.

   c. To see that policy and procedures guides covering the activities of this division are developed; written and maintained in manuals.

3. Accounting Responsibilities.

a. Appraisal of the financial results of the operations of the corporation and of each of the operating groups and the benefits received from the expenditures.

b. Supply financial services and assistance where ever needed.

c. Appraisal of proposed expenditures.

d. Setting up of systems for computing product costs in each of the operating group.

e. Comparison of expenditure with budget.

f. Setting up the principles and methods of keeping accounts and accounting control, in the Corporation and in each of the operating group.

g. Setting up of procedures for the receipt, banking, custody and disbursement of money.

h. Forecasting the financial results of the Corporation and ea of the operating group.

i. Directing the internal audit of the Corporation and each of the operating group.

j. Provision of insurance and reserves.

k. Preparation of accounting and statistical reports.

l. Appraisal of loan applications.

m. Setting up the principles and methods of granting loans and the control of loan services, for approval of Director-General.

3. Human Relations Responsibilities.

(With advice and assistance of the Personnel Director).

a. To write administrative directives for the selection, promotion, demotion and removal of members of management under his direct contr

b. To recommend, for the approval of the Director-General, competent executives for the operation of the major activities under his control, to see that they are properly trained and fully informed and to coordinate the efforts of all personnel reporting to him.

c. To assist in the administration of the wage and salary procedures and in the formulation of managerial and employee benefit plans

d. To participate in the formulation of relationships with organised Labor.

4. Legal Responsibilities.

(With the advice and assistance of Legal Counsel).

To see that all agreements and contracts are in accordance with Corporation policies.

5. Committee Responsibilities.

To serve specifically on the following committees:

(List of committees)

6. Public Responsibilities.

a. To maintain close personal relationships with officers of customers, prospective customers and vendors.

b. To promote harmonious relations with government agencies, the press and the general public.

D. Authority.

The Director of Finance and Accounts is authorized to take any reasonable action necessary to carry out the responsibilities assigned to him so long as such action does not deviate from established corporation policies and is consistent with sound business judgment, except for specific limitations placed upon his authority by the Director-General, the By-laws of the Corporation or the Policy Guide.

E. Accountability.

a. To set profit objectives of the Corporation.

b. To seek constantly for improvement and cost reductions.

c. To establish effective accounting controls for the Corporation and each of the operating group.

d. To establish effective accounting controls for the loan division.

e. To build morale within his division.

Technical Director

A. Basic Functions.

In accordance with the authority delegated by the Director-General, the Technical Director shall be responsible for the planning, design and construction of all new projects to be developed by the Corporation.

B. Organization Responsibilities.

1. The Technical Director reports directly to the Director-General.

2. The following individuals report to the Technical Director:

   a. Executive Officer - Steel project
   b. " " - Jute project
   c. " " - Sugar projects
   d. " " - Cement projects
   e. " " - Rice Bran project
   f. (List of other officers)

C. Specific Responsibilities.

1. Management Responsibilities.

a. To direct the pre-planning of each project, including statistical and economic considerations and the financial potentials.

b. To direct the designing of each project including all the engineering of buildings, machinery and equipment and service facilities and the writing of the technical specifications for the Tender notices. To assist in the analysis of the tenders and the selection of the best one.

c. To direct the construction of each project including installation of all machines, equipment, service facilities.

d. To turn over the complete new plant ready for operation to the operating group.

e. To analyse and appraise regularly and systematically the effectiveness of all operations of the Corporation under his control.

f. To see that officers under his direction are delegated adequate authority to carryout their responsibilities and objectives, but that appropriate limitations of their authority are defined in writing and clearly understood.

2. Organisation Responsibilities.

a. To see that the approved basic plan of organization is established and observed within his division.

b. To see that policy and procedure guides covering the activities of his division are developed, written and maintained in Manual

3. Accounting & Responsibilities.

(With advice and assistance of Director of Finance & Accounts).

a. To establish sound accounting administration for his divisio

b. To review budgets for operations under his control and to render such modifications and recommendations as he deems appropriate befo their submission to the Director-General.

c. To analyse and report to the Director-General the results of his division's operations.

4. Legal Responsibilities.

(With advice and assistance of Legal Counsel).

To see that all agreements are in accordance with Corporation policies.

5. Engineering Responsibilities.

(With advice and assistance of Director of Engineering Services).

To establish basic general engineering policies for the designing of each project.

6. Committee Responsibilities.

To serve specifically on the following Committees.

a. (List of applicable committees).

7. Human Relation Responsibilities.

(With advice and assistance of Personnel Director).

a. To write administrative directives for the selection, promotion, demotion and removal of members of management under his direction.

b. To recommend, for the approval of the Director-General, competent executives for the operation of the major activities under his control and to coordinate the efforts of all personnel reporting to him.

8. Public Responsibilities.

a. To maintain close personal relationships with successful tenderers and other vendors.

b. To promote satisfactory relations with government agencies, the press and the general public.

D. Authority.

The Technical Director is authorized to take any reasonable action necessary to carry out the responsibilities assigned to him so long as each action does not deviate from established Corporation policies and is consistent with sound business judgment except for specific limitations placed upon his authority by the Director-General, the By-laws or the Policy Guide.

E. Accountability.

1. To set and meet schedules for the planning, design and construction of each project.

2. To seek constantly for improvements and cost reductions.

3. To establish effective accounting and reporting controls throughout all parts of his division.

4. To review his officers reports of progress, problems and solutions of problems within their respective areas of responsibility.

5. To build morale in the organization.

General Administrator

A. Basic Functions

In accordance with the authority delegated by the Director-General the Administrator shall be responsible for the following departmental activities, Economics, Statistics, General Office and Organisation Planning. The economics section is responsible for the study, research, reporting and planning to aid in the solution of economic problems arising from the decision to establish an industry, or from the production and distribution of goods of the operating group. The statistical section is responsible for the discovery of fact and the interpretation of them from quantitative data by the application of statistical methods and techniques. The general office section is responsible for the performance of the usual clerical activities. The organization planning section is responsible for the maintenance of a rational division of the work load by constant integrated studies. The purchasing section is responsible for the purchasing of equipment and supplies.

B. Organizational Relationships

1. The General Administrator reports to the Director-General
2. The following individuals report to the Administrator.
    - a. Chief Economist.
    - b. Chief Statistician.
    - c. Office Manager.
    - d. Organization Planner.
    - e. Purchase Officer.

C. Specific Responsibilities

1. Managerial Responsibilities.

a. To direct his division through its departments in accordance with established policies and objectives.

b. To analyse and appraise regularly and systematically the effectiveness of all operations under his control.

c. To see that officers under his direction are delegated adequate authority to carry out their responsibilities but that appropriate limitations of their authority are defined in writing and are clearly understood.

2. Organization Responsibilities.

a. To see that the approved basic plan of organization is established and observed in his division.

b. To see that policy and procedure guides covering the activities of his division are developed, written and maintained in manuals.

c. To act in an advisory capacity to each member of the operating group.

3. Accounting Responsibilities

(With the advice and assistance of the Director of Finance and Accounts).

a. To establish sound accounting administration within his division.

b. To review budgets for operations under his control and to render such modifications and recommendations as he deems appropriate before their submission to the Director-General.

c. To analyse and report to the Director-General the results of his divisions operations.

4. Human Relations Responsibilities.

(With the advice and assistance of Personnel Director).

a. To write administrative procedures for the selection, promotion, demotion and removal of members of management under his direct control

b. To recommend for the approval of the Director-General, competent officers for the operations of the major departments under his control, to see that they are properly trained and fully informed, and to coordinate the efforts of all officers report to him.

c. To participate in the formulation of relationships with organized labor.

5. Committee Responsibilities.

To serve specifically on the following committees.

(List of committees)

6. Public Responsibilities.

a. To promote satisfactory relations with government agencies, trade groups, professional societies, the press and the General Public.

D. Authority

The Administrator is authorized to take any reasonable action necessary to carry out his responsibilities assigned to him so long as such action does not deviate from established Corporation policies and is consistent with sound business judgment except for specific limiations placed upon his authority by the Director-General, the By-laws or the Policy Guide.

E. Accountability

a. To seek constantly for improvements and cost reductions.

b. To establish effective accounting and reporting systems in all parts of his division.

c. To consult with and advise the staff members of the Corporation and each member of the operating group.

d. To review the department officers reports of progress, problems, solutions of problems within their respective areas of responsibility.

e. To build morale in his division.

Personnel Director

A. Basic Function

In accordance with the authority delegated by the Director-General the Personnel Director shall endeavour to create a feeling of understanding between the Corporation and the men and women in its organization for their mutual satisfaction. His primary objective shall be the maintenance of an adequate working force within the Corporation and its operating group.

B. Organization Relationships

1. The Personnel Director reports to the Director-General.
2. The following individuals report to the Personnel Director.
   a. Officer in charge of Selection and Employment.
   b. " " " Salary and Wage Administration.
   c. " " " Medical and Health Facilities.
   d. " " " Safety.
   e. " " " Training.
   f. " " " Records.
   g. " " " Services and Benefits.
   h. " " " Transfer and Promotion.
   i. " " " Employee Communications.
   j. " " " Union Contractual Relations.

C. Specific Responsibilities

1. Management Responsibilities.

a. To assist the Director-General in the formulation of Corporation personnel policies.

b. To analyse and appraise regularly and systematically the effectiveness of all operations under his control, to see that the Corporation policies are observed and to take prompt corrective action as needed.

c. To see that officers under his direction are delegated adequate authority to carry out their responsibilities and objectives, but that appropriate limitations of their authority are defined in writing and clearly understood.

2. Organization Responsibilities.

a. To establish a sound organization structure within his division.

b. To see that policy and procedure guides covering the activities of his division are developed, written and maintained in manuals.

3. Accounting Responsibilities.
(With the advice and assistance of the Director of Fiance and Accounts)

a. To establish sound accounting administration within his division.

b. To review budgets for operations under his control and to render such modification and recommendation as he deems appropriate before their submission to the Director-General.

4. Legal Responsibilities.
(With the advice and assistance of Legal Counsel).

To see that all union contractual relationships are in accordance with the Corporation's policies.

5. Human Relation Responsibilities.

a. To write administrative directives for carrying out the Corporation's personnel policies, within the Corporation and the operating group.

b. To write administrative procedures for the selection, promotion, demotion and removal of members of management under his direct control.

c. To set up administrative procedures for wage and salary administration and the retirement and succession of members of management.

d. To formulate plans for managerial and employee services, benefits, communications and vacations.

e. To set up procedures for selection, transfer and promotion of all employees.

f. To set up and control all training and educational activities, both within and without the Corporation.

g. To set up and maintain the medical and health section as well as the safety section.

h. To represent the Corporation in Union contract negotiations.

6. Committee Responsibilities.

To serve specifically on the following committees:

(List of applicable committees)

7. Public Responsibilities

a. To maintain close personnel relations with all employees of the Corporation.

b. To promote satisfactory relations with government agencies, trade associations, professional societies, the press and the general public.

D. Authority

The Personnel Director is authorized to take any reasonable action necessary to carry out the responsibilities assigned to him so long as such action does not deviate from established corporation policies and is consistent with sound business judgement except for specific limitations placed upon his authority by the Director-General, the By-laws or the Policy Guide.

E. Accountability

a. To build the morale of the Corporation.

b. To maintain consistency in all personnel policies.

c. To seek constantly for improvement and cost reduction.

d. To review staff and operating group officers reports of activities and solution of problems with their respective areas of responsibility.

e. To try to render a suitable accounting for the money spent in his division.

Director of Engineering Services

A. Basic Function

In accordance with the authority delegated by the Director-General the Director of Engineering Services shall direct all activities of any and every type of engineering service. This includes Civil, Mechanical, Electrical engineering and other specialized fields as the needs develop. He is responsible for the coordinating all major activities of his division and for obtaining results in keeping with the Corporation policies and objectives.

B. Organization Responsibilities

1. The Director of Engineering Services reports to the Director-General.

2. The following individuals report to the Director of Engineering Services:

   a. Chief Civil Engineer
   b. Chief Electrical Engineer
   c. Chief Mechanical Engineer
   d. Engineering Industry Project Officer
   e. (List of other persons)

C. Specific Responsibilities

1. Management Responsibilities.

a. To direct the activities of his division in accordance with established policies and objectives.

b. To assist the Technical Director in the design and construction of each project.

c. To analyse, review and submit recommendations on matters related to design and construction, to alteration and expansion, the maintenance and repair and other engineering development service that require the approval of the Director-General.

d. To analyse and appraise regularly and systematically the effectiveness of all operations of the Corporation under his control.

e. To see that officers under his direction are delegated adequate authority to carry out their responsibilities and objectives, but that appropriate limitations of their authority are defined in writing and clearly understood.

2. Organization Responsibilities.

a. To establish a sound organization structure in his division.

b. To see that policy and procedure guides covering the activities of the division are developed, written and maintained in manuals.

3. Accounting Responsibilities.

(With the advice and assistance of Director of Finance & Accounts).

a. To establish sound accounting procedures within his division.

b. To review budgets for operations under his control and to render such modifications and recommendations as he deems appropriate.

c. To analyse and report to the Director-General the results of his division's operations.

4. Legal Responsibilities.

(With the advice and assistance of Legal Counsel).

To see that all agreements and sub-contracts are in accordance with Corporation policies.

5. Engineering Responsibilities.

a. To provide for design, development and construction for plant, machinery and equipment.

b. To provide for the maintenance repair and replacement of machinery and equipment.

c. To establish engineering methods.

d. To set engineering standards.

e. To audit and report on the application of engineering processes

6. Manufacturing Responsibilities.

a. To act in advisory capacity to:

(1) Manufacturing officer of each of the operating group.

(2) Plant engineer and/or maintenance officer of each of the operating group.

7. Human Relation Responsibilities.

(With the advice and assistance of the Personnel Director).

a. To write administrative procedures for the selection, promotion, demotion and removal of members of management under his direct control.

b. To recommend for approval of the Director-General competent officers for the operation of all major activities under his control and to see that they are properly trained and fully informed.

c. To participate in the formulation of managerial and employee benefit and vocation plans.

d. To participate in the formulation of relationships with organized labor.

8. Committee Responsibilities.

To serve specifically on the following committees:

(List of Committees)

9. Public Responsibilities.

a. To maintain close personal relationships with officers of important contractors and vendors.

b. To promote satisfactory relations with government agencies, trade associations, the press and the general public.

D. Authority

The Director of Engineering Service is authorized to take any reasonable action necessary to carry out the responsibilities assigned to him so long as such action does not deviate from established corporation policies and is consistent with sound business judgement except for specific limitations placed upon his authority by the Director-General the By-laws or the Policy Guide.

E. Accountability

a. To seek constantly for improvements and cost reduction.

b. To establish effective accounting and reporting controls in all parts of his divisions.

c. To review the officers reports of progress, problems, and solutions of problems within their respective area of responsibility.

d. To build morale in his division.

Secretary of I.D.C. Board

Basic Function

1. Preparation and transmission of notices of Board meetings and their agenda, attending the meetings as Secretary, keeping minutes and distributing them.

2. Custody of the seal of the Corporation, its charter, Legislative Act 1952, revisions thereof, the By-laws and General Policy Guide.

3. Preparation and filing of all reports of general corporate activities.

APPENDIX II

Cottage and Small Scale Industries Board

Project Status

30 September 1955

APPENDIX II

COTTAGE AND SMALL SCALE INDUSTRIES BOARD

From Progress Report Analysis, 4th Quarter; 1954-55
conomic and Social Board

Ser. No.	Project or Programme	Project Description	Physical Progress as of September 30, 1955
1	Pilot Plant - Sugar	Pilot plants to train workers in the techniques of production and handling of machinery and equipment.	Completed and operation started in January 1955. Planning for procurement of additional machinery for converting the present open-pan to vacuum-pan boiling plant.
2	Pilot Plant - Condensed Milk		One unit of Condensed Milk Pilot Plant has been completed at Maymyo and initial production will be started by the end of December 1955. Two storage godowns and quarters for labourers are under construction at Maymyo. Tenders have been sent to the Union of Burma Purchase Board for procurement of machinery for power pressure and another complete unit.
3	Pilot Plant - Pottery		Completed and operation started in April 1955. Twenty trainees are undergoing training.
4	Pilot Plant - Tiles	Three plants to be constructed at Moulmein, Shwebo and Prome.	One unit of tile pilot plant has been completed and trial run started at Moulmein. Building construction completed and machinery installation started at Shwebo - Site selection for Prome underway.

16/2/56

Ser. No.	Project of Programme	Project Description	Physical Progress as of September 30, 1955
5	Textile Weaving Training	Modern methods used in various industries are being taught at the training classes given in these projects.	Fifteen trainees are still undergoing training at Amarapura. Planning for procurement of spare parts and power loom weaving machinery for Amarapura. Tenders have been received for the construction of two silk weaving centres at Shwedaung and Amarapura. Machinery has arrived for these centres.
6	Textile Printing Training		The 4th group of 15 students of textile printing has completed the course while the 5th of 14 trainees is now undergoing training. Site for the construction of building under consideration.
7	Hand Paper Making		The first group of 18 trainees has completed the course while the second group of 25 students is undergoing training.
8	Electroplating and Anodizing		Planning for new building. Training started at the temporary training centre at Insein.
9	Dry Cell and Accumulator Manufacturing		Final Planning
10	Lacquerware Manufacturing		Training in all aspects of lacquerware making has been completed. Construction of one studio has been completed while procurement of machinery for another studio is being planned.

Ser. No.	Project or Programme	Project Description	Physical Progress as of September 30, 1955
11	Bamboo utilization and wood working	Modern methods used in various industries are being taught at the training classes given in these training projects.	Final Planning
12	Agricultural Machinery such as Thrashing machine, Chaff cutter, Straw Mat making machine etc.		Machinery has arrived. Planning for installation of this machinery at Pyapon, Meiktila, Yenangyaung and Paungde.

16/2/56

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APPENDIX III

Industrial Development Programme Project Status

30 September, 1955

(Not including mineral, forest, and agricultural processing projects being developed by MRDC, STB, ARDC, and others)

APPENDIX III

Industrial Development Programme Project Status

(Not including mineral, forest, and agricultural processing projects being developed by MRDC, STB, ARDC, and others)

30 September 1955

1. Projects under Contract

Steel Products.

A plant to produce from 16 to 20 thousand tons per year of wire and rod products (nails, bolts, screws, nuts, rivets, plain and barbed wire) and corrugated galvanized sheets from carbon steel scrap and worn rails is under construction. Production is expected in early 1957. The estimated total cost of the mill is about K crores.

The operating organization of this plant has been established. Top management personnel is being assembled and definite training plans and schedules have been made to fit Burmese Nationals to take over these posts.

A scrap collecting program has been underway for about a year and approximately 45,000 tons have been accumulated. Experience with the metals collected indicates that the probable amount of low carbon steel scrap available in the country is proving to be less than was anticipated; much ordnance and other war-generated material is generally composed of alloy steels which cannot be used effectively in the plant now under construction.

To assure future supplies of iron, a contract was awarded for exploration of two iron ore bodies to determine types and reserves at Tavoy and at Taunggyi. A comprehensive report has been submitted which indicates probable reserves up to 30 million tons in Taunggyi and perhaps 6 to 10 million tons in Tavoy. Further studies by competent persons on possible uses of the ore, in both cast iron and steel making are being considered.

Sugar Mill - Namti, Kachin State.

This mill, which will produce 15,000 tons of white sugar annually, will start production in February 1956. Located in an area where cane growing ceased with the advent of war, re-establishment of agricultural activity to provide for full capacity operation will require several years. The estimated total cost of the plant is K 1.3 crores.

The operating organization of this mill has been determined. Contracts for top management personnel are being written. Training programs have been established for the executive posts as well as for subordinate levels.

An alcohol plant for molasses conversion was originally proposed at this site. However, further studies indicate that another location is more desirable, as discussed below.

Sugar Mill - Pyinmana.

Annual production here will be 22,500 tons of white sugar. The mill is located in an area where cane has been grown for many years so production of raw materials will not be a difficult problem. Estimated total cost K 1.8 crores.

The complete operating organization of this mill has been determined and the "standard muster" confirmed. Selection of top-management personnel is being made. Training for the lower echelons of management is being done in the Zeyawaddi mill. Training for the executive posts, for Burmese nationals, has been programmed and in several instances is already underway.

The combined capacity of Namti, Pyinmana and the existing Zeyawaddi Factory at full operation will be about 25% more than the present domestic demand. If demand does not increase with production, studies should be made of the possibility of closing down the Zeyawaddi factory pending modernization or conversion to raw sugar production for export, when demand dictates.

Utilization of molasses produced as a by-product during manufactur of sugar remains a problem. It appears that the only practicable use for the potential 1,200,000 gallons of alcohol annually is as a motor fuel component. If this end use is adopted, a 4,500-gallon per day distillery should be located at the Pyinmana factory or at Mandalay since these are the most central points. A detailed location study is being prepared. As an alternative, consideration could be given to increasing the capacity of the distillery at the new Pharmaceutical Institute in Rangoon and adding a stripping unit for producing anhydrous ethel alcohol from both molasses and spoiled rice.

Jute Bag and Twine Mill.

Annual production: 24 million gunny bags. Initial production is scheduled for May 1956. This mill will conserve nearly K 3 crores in foreign exchange annually when sufficient domestic fibre is produced for full capacity. Present domestic fibre production is estimated at less than 20% of requirements. Emphasis on growing of jute locally is required so that the mill's full potential benefit to the economy may be realized. The estimated total cost of the plant is K 3 crores.

The mill's operating organization has been finalized. Training programs for all levels of management and supervision have been started. To management personnel are being selected and will be on hand to begin operations when construction is finished.

Clay Tile and Brick Plant.

Construction of this plant with a capacity of 6 million roofing tiles and 8 million bricks annually is scheduled to be completed by March 1956. It is anticipated that commercial production will be underway by the following June.

Management and operation is being handled by the National Housing Board.

Pharmaceutical Plant.

This plant costing K 6.3 crores is intended to produce biologicals, sterile pharmaceuticals, general pharmaceuticals, vitamins and alcohol. Construction is about 75% completed. Manufacture of some products has already commenced. The plant will be operated under a management contract with Evans Medical Supplies Ltd., a well-known manufacturer of Pharmaceuticals.

Tea Packing and Blending Factory.

This plant, located at Mandalay to process and pack tea, is nearly complete and will operate as a joint venture with Thos. Lipton Ltd. Estimated total cost K 16 lakhs.

Concrete Products Plant.

It is intended to produce concrete pipe at present and cement-asbestos products in the future. A joint venture has been formed with the Bombay Burmah Trading Co. Ltd., in which Government equity is 60% and private 40%. It is capitalized at K 7.5 lakhs.

2. Projects under Implementation but for which contracts have not been awarded

Thayetmyo Cement Mill Extension.

The present Thayetmyo plant is the only cement mill in Burma and can, at full capacity, produce 60,000 tons annually. The average annual imports of cement into Burma for 1953 and 1954 were about 46,000 tons. In view of the excess of demand over production, tenders have been received and analyzed for a 60,000-ton extension to the present mill. Contract awards should be made at an early date. The estimated cost of the extension is K 2 crores.

The Thayetmyo plant is presently suffering from a lack of transportation facilities for its product. Studies have been made of this situation and provision of bulk transport under operation by the Cement Board appears to be the best solution.

In addition to the extension to the present plant a new plant has been proposed but this is being held in abeyance for the time being. Domestic demand has not yet exceeded the capacity of the Thayetmyo plant plus the new extension and since the anticipated increase in the rate of consumption may be decreased by the current financial stringency, the immediate necessity for a new plant remains to be demonstrated. Cement is a very easy business to overbuild, depending as it does on new construction work undertaken, and new factories should be carefully correlated with demand. Installation at a later date of a third kiln at Thayetmyo may be the best way in which to meet increased demands.

Detailed recommendations for the organisation of the enlarged mill have been made. This includes a training plan and schedule for supervisors and executives. This training program can be expanded to include the personnel needed for the proposed additional cement factory if it is eventually built.

Cotton Spinning and Weaving Factory Rangoon - Expansion.

Construction of an additional 20,000-spindle, 200-loom unit is under negotiation. It will be designed to spin No. 20 yarns from domestic Mahlaing 5-fibre.

Textile Finishing Plant.

Tenders have been received for this project. No contracts have yet been awarded. The plant will bleach, dye, and finish cotton fabrics.

Pulp and Paper Mill.

Negotiations are being pursued actively for a joint venture for the construction and operation of pulp and paper mill. Reports have been prepared by Japanese and American consultants and methods of financing are now under discussion. Terms of the joint venture will include provisions for management and operation. This project is being developed by the Paper Mill Board.

3. Projects for which Appropriations have been made; under investigation

Cotton Spinning Plant.

Two proposals for joint ventures have been received from Japanese firms for mills up to 40,000 spindles capacity for possible location in Myingyan. The proposals suggest that raw cotton for this mill should be imported. Single 20's yarn would be the principal product. Joint Venture arrangements have not yet been finalized. Government's equity has been estimated at K 3.4 crores.

Electric Motor Assembly Plant.

Establishment of facilities for assembling fans and general purpose motors up to 5 h.p. is being seriously considered. Imported components to be used initially will be gradually replaced by domestically produced items where practicable. The estimated cost is K 37 lakhs.

Asbestos - Cement Roofing and Piping.

These much needed products will be manufactured within the country when domestic cement production permits. The project may be joint venture with a firm now engaged in concrete pipe production. The estimated cost is K 43 lakhs.

Rubber Tyres and Tubes.

It is planned to implement this project in 1958. The capacity and cost has not been finalized.

Glass Containers.

This project is presently scheduled for construction in 1958. The capacity and cost are not finalized. A report has been prepared by Phoenicia which indicates that this would be a profitable enterprise.

Integrated Fishing Industry.

Extension of the existing fishing industry with addition of cold storage and canning facilities. Cost not finalised.

4. Projects investigated and reports prepared; no appropriation

Fertilizer and Sulphuric Acid Plant - Rangoon.

A 50,000-ton per year superphosphate plant and a unit for mixing an equal quantity of nitrogenous material. Total capacity will be 100,000 tons of mixed fertilizer. Estimated cost K 55 lakhs.

Veneer and Plywood Plant.

To produce 11,000,000 square feet per year of plywood for tea boxes, forms and building materials. Several private groups are interested in implementation, possibly as a joint venture. Estimated cost K 27 lakhs.

Joinery.

To produce doors and window frames and other standard finished mill work. Estimated cost K 28 lakhs.

Sawmill for non-Teak Wood.

To produce dimension lumber for furniture factory and joinery. Estimated cost K 48 lakhs.

Saltern - Moulmein.

To produce high grade salt by solar evaporation process including facilities for refining salt for domestic use. Estimated cost K 25 lakhs.

Soya Milk Products Plant.

To produce 40,000 pints per day of soya milk from soya beans. Also to produce powdered milk by spray drying. This project has been brought up to the implementation stage and can be started quickly. Estimated cost K 29 lakhs.

Furniture Plant.

To produce standard furniture, desks and chairs. Estimated cost K 14 lakhs.

Sulphuric Acid Plant - Myingyan.

To produce sulphuric acid from sulphur, gypsum, or zinc smelter gases - capacity 475 LT per day. Product to be used in fertiliser plant. To be held in abeyance pending study of agricultural economics. Estimated cost K 1194 lakhs.

Ammonium Fertilizer Plant.

To produce 450 LT per day of ammonium sulphate and 475 LT per day of superphosphate fertilizer using the product of the Sulphuric Acid Plant. This project is combined with the Sulphuric Acid Plant and included in its cost estimate. The Fertilizer projects should be reviewed in light of Balu Chaung power development. There is a possibility of urea production by using electric power plus coal and limestone. This would eliminate the necessity for sulphuric acid.

Marine Engine Plant.

To recondition marine engines. This is combined with the Shipyard Project. Estimated cost K 2 lakhs.

Shipyard.

To build boats and ships. The project include a 10,000-ton dry dock. It is combined with Marine Engine Plant in cost. Japanese experts are now studying this project.

Wood Waste Wallboard.

To produce wallboard from waste wood. Estimated cost K 53 lakhs.

5. Projects proposed for future development

Lime Industry - Expansion.

To produce 40,000 LT quick lime and hydrated lime per year in rotary kiln plant, includes quarry and crushing equipment, barges and tugs, process machinery and storage. Estimated cost K 106 lakhs.

Fish Meal and Fish Oil Plant.

To produce 5,000 LT per year of fish meal, and 450,000 gallons per year of fish oil. This project should be combined with Fish and Sea Food Canning Plant in study and implementation stages. Estimated cost K 4 lakhs.

Limestone Products Plant.

To produce aggregate and crushed rock for railway and highway use (300,000 LT per year). This project should be combined with the expansion of the Portland Cement and Lime Products Industries, using some raw material deposits and transport equipment. Estimated cost K 5 lakhs.

Sand and Gravel Plant.

To wash and screen 15,000 tons per month of sand and fine aggregate for concrete and other construction materials. Estimated cost K 9 lakhs.

Ready Mixed Concrete Plant.

To produce and deliver 400 tons per day of premixed concrete. Estimated cost K 5 lakhs.

Calcium Carbide Plant.

To produce 3,000 LT of calcium carbide per year. Estimated cost K 25 lakhs.

Vinyl Plastics Plant.

To produce 2,500 LT per year of vinyl plastics from calcium carbide, etc. Depends on construction of Calcium Carbide Plant Project. Estimated cost K 71 lakhs.

Paper Products Plant.

To manufacture 2,000 tons per year of bags and cartons and other paper products. Estimated cost K 75 lakhs.

Shoe Factory.

To produce 1,000 pairs of leather shoes and boots per day. Estimated cost K 125 lakhs.

Ceramics Plant.

To manufacture 400,000 pieces per month of crockery tableware. Estimated cost K 124 lakhs.

Paint and Varnish Plant.

To manufacture 10,000 gallons of paints, enamels and varnishes and rubber latex per week. Estimated cost K 23 lakhs.

Turpentine and Resin Plant.

To manufacture 1,200 gallons of turpentine and resin per week for use in paint, pharmaceutical and other industries. Estimated cost K 20 lakhs.

Tobacco Products Plant.

To manufacture cigarettes, cigars, and smoking tobacco. Estimated cost K 40 lakhs.

Explosives.

To manufacture commercial and military explosives. (10 tons of dynamite and 5 tons of black powder per day). This project depends on production of ammonia. Estimated cost K 4 lakhs.

Electrical Appliance Plant.

To manufacture electric distribution switches, insulators, electric bulbs, torches, heaters, stoves, fans, small motors, meter boxes, electric irons and other appliances. Estimated cost K 1 lakh.

Copper Smelter - Rolling and Wire Mill.

To produce 2 to 2½ tons per day of copper wire from ores; also stranded wire and shapes. Estimated cost K 90 lakhs.

Motor Car Assembly Plant.

To assemble 2,500 trucks and motor cars per year. (1,500 motor cars, 750 trucks, 250 buses). Estimated cost K 200 lakhs.

Radio Assembly Plant.

To assemble 150 standard radio sets per day plus 20 standard and short wave sets from imported parts. Estimated cost K 25 lakhs.

Coal Tar Products Plant.

To manufacture coal tar products from Kalewa Coal. Estimated cost K 40 lakhs.

Rayon Plant.

To manufacture 1,500 tons per year of rayon thread from Burma raw materials. Its success is conditional on world markets and source of cellulose. Estimated cost K 2 lakhs.

Machine Tool and Engineering Industry Plant.

To manufacture a limited number of machine tools and equipment; lathes, shapers, milling machines, drills, hydraulic presses and other shop ~~tools and~~ agricultural equipment. The plant will include a pattern shop, die shop, foundry, forge, machine shop, and assembly shop. Estimated cost K 25 lakhs.

Wood Waste Chemical Plant.

To produce charcoal and chemicals from distilling wood waste. Estimated cost K 80 lakhs.

Tannin and Cutch Plant.

To produce tannin from mangrove bark, and cutch. Estimated cost K 21 lakhs.

Bagasse Paper Products.

To produce 5,000 tons per year of paper as a by-product of sugar mill waste. Since bagasse is used as a fuel at the sugar mill, the outlook for excess bagasse is not good unless solid or liquid fuel is supplied as a supplement. Estimated cost K 90 lakhs.

Fruit Processing Plant.

Processing, preserving and canning fresh fruit. Estimated cost K 40 lakhs.